INSTALLATION MANUAL

PREDATOR®

SINGLE PACKAGE AIR CONDITIONERS AND SINGLE PACKAGE ELECTRIC UNITS

DM090, 120 and 150

7-1/2 TO 12-1/2 TON

(380V, 3 Phase, 60 HZ)

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NOTES, CAUTIONS AND WARNINGS

The installer should pay particular attention to the words: *NOTE*, *CAUTION*, and *WARNING*. Notes are intended to clarify or make the installation easier. Cautions are given to prevent equipment damage. Warnings are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

CAUTION: READ ALL SAFETY GUIDES BEFORE YOU BEGIN TO INSTALL YOUR UNIT.

SAVE THIS MANUAL

035-17311-003-A-0704

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GENERAL

YORK® Predator® units are single package air conditioners designed for outdoor installation on a rooftop or slab and for non-residential use. These units can be equipped with factory or field installed electric heaters for heating applications.

These units are completely assembled on rigid, permanently attached base rails. All piping, refrigerant charge, and electrical wiring is factory installed and tested. The units require electric power and duct connections. The electric heaters have nickel-chrome elements and utilize single-point power connection.

SAFETY CONSIDERATIONS

Due to system pressure, moving parts, and electrical components, installation and servicing of air conditioning equipment can be hazardous. Only qualified, trained service personnel should install, repair, or service this equipment. Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters.

Observe all precautions in the literature, labels, and tags accompanying the equipment whenever working on air conditioning equipment. Be sure to follow all other applicable safety precautions and codes.

Wear safety glasses and work gloves. Use quenching cloth and have a fire extinguisher available during brazing operations.

INSPECTION

As soon as a unit is received, it should be inspected for possible damage during transit. If damage is evident, the extent of the damage should be noted on the carrier's freight bill. A separate request for inspection by the carrier's agent should be made in writing.

⚠WARNING

This furnace is not to be used for temporary heating of buildings or structures under construction.

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury. Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency.

REFERENCE

Additional information is available in the following reference forms:

- General Installation - DM090 - 150, 035-17311-002
- Pre-start & Post-start Check List - 035-18466-000
- Economizer Accessory -
  Downflow Factory Installed, 035-18286-000
  Downflow Field Installed, 035-18285-000
  Horizontal Field Installed, 035-18287-000
- Motorized Outdoor Air Damper 035-18283-000
- Manual Outdoor Air Damper (0-100%) 035-18282-000
- Manual Outdoor Air Damper (0-35%) 035-18281-000
- Electric Heater Accessory 035-17291-001
- Unit Renewal Parts List 035-17288-000

APPROVALS

Design certified by CSA as follows:

1. For use as a cooling only unit, cooling unit with supplemental electric heat or a forced air furnace.
2. *For outdoor installation only.*
3. For installation on combustible material and may be installed directly on combustible flooring or, in the U.S., on wood flooring or Class A, Class B or Class C roof covering materials .

⚠ CAUTION

This product must be installed in strict compliance with the enclosed installation instructions and any applicable local, state, and national codes including, but not limited to, building, electrical, and mechanical codes.

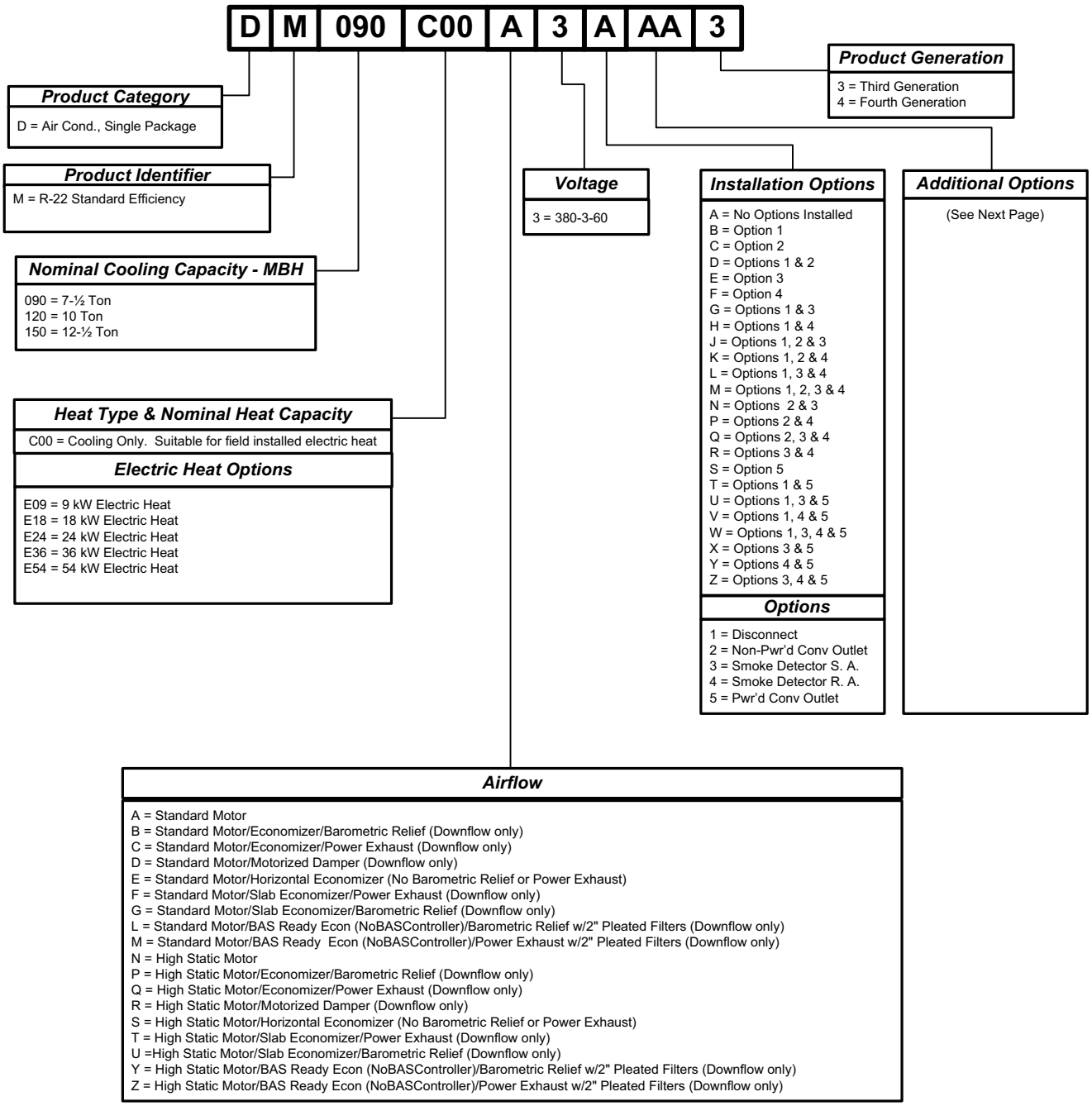
⚠WARNING

Incorrect installation may create a condition where the operation of the product could cause personal injury or property damage.

The installer should pay particular attention to the words: NOTE, CAUTION, and WARNING. NOTES are intended to clarify or make the installation easier. CAUTIONS are given to prevent equipment damage. WARNINGS are given to alert installer that personal injury and/or equipment damage may result if installation procedure is not handled properly.

NOMENCLATURE

6½ - 12½ Ton Predator Model Number Nomenclature


D M 090 C00 A 3 A AA 3
Product Category
D = Air Cond., Single Package
Product Identifier
M = R-22 Standard Efficiency
Nominal Cooling Capacity - MBH
090 = 7-½ Ton
120 = 10 Ton
150 = 12-½ Ton
Heat Type & Nominal Heat Capacity
C00 = Cooling Only. Suitable for field installed electric heat
Electric Heat Options
E09 = 9 kW Electric Heat
E18 = 18 kW Electric Heat
E24 = 24 kW Electric Heat
E36 = 36 kW Electric Heat
E54 = 54 kW Electric Heat
Airflow
A = Standard Motor
B = Standard Motor/Economizer/Barometric Relief (Downflow only)
C = Standard Motor/Economizer/Power Exhaust (Downflow only)
D = Standard Motor/Motorized Damper (Downflow only)
E = Standard Motor/Horizontal Economizer (No Barometric Relief or Power Exhaust)
F = Standard Motor/Slab Economizer/Power Exhaust (Downflow only)
G = Standard Motor/Slab Economizer/Barometric Relief (Downflow only)
L = Standard Motor/BAS Ready Econ (NoBASController)/Barometric Relief w/2" Pleated Filters (Downflow only)
M = Standard Motor/BAS Ready Econ (NoBASController)/Power Exhaust w/2" Pleated Filters (Downflow only)
N = High Static Motor
P = High Static Motor/Economizer/Barometric Relief (Downflow only)
Q = High Static Motor/Economizer/Power Exhaust (Downflow only)
R = High Static Motor/Motorized Damper (Downflow only)
S = High Static Motor/Horizontal Economizer (No Barometric Relief or Power Exhaust)
T = High Static Motor/Slab Economizer/Power Exhaust (Downflow only)
U =High Static Motor/Slab Economizer/Barometric Relief (Downflow only)
Y = High Static Motor/BAS Ready Econ (NoBASController)/Barometric Relief w/2" Pleated Filters (Downflow only)
Z = High Static Motor/BAS Ready Econ (NoBASController)/Power Exhaust w/2" Pleated Filters (Downflow only)
Voltage
3 = 380-3-60
Installation Options
A = No Options Installed
B = Option 1
C = Option 2
D = Options 1 & 2
E = Option 3
F = Option 4
G = Options 1 & 3
H = Options 1 & 4
J = Options 1, 2 & 3
K = Options 1, 2 & 4
L = Options 1, 3 & 4
M = Options 1, 2, 3 & 4
N = Options 2 & 3
P = Options 2 & 4
Q = Options 2, 3 & 4
R = Options 3 & 4
S = Option 5
T = Options 1 & 5
U = Options 1, 3 & 5
V = Options 1, 4 & 5
W = Options 1, 3, 4 & 5
X = Options 3 & 5
Y = Options 4 & 5
Z = Options 3, 4 & 5
Options
1 = Disconnect
2 = Non-Pwr'd Conv Outlet
3 = Smoke Detector S. A.
4 = Smoke Detector R. A.
5 = Pwr'd Conv Outlet
Additional Options
(See Next Page)
Product Generation
3 = Third Generation
4 = Fourth Generation

NOMENCLATURE, ADDITONAL OPTIONS:

AA	None
AB	Phase Monitor
AC	Coil Guard
AD	Dirty Filter Switch
AE	Phase Monitor & Coil Guard
AF	Phase Monitor & Dirty Filter Switch
AG	Coil Guard & Dirty Filter Switch
AH	Phase Monitor, Coil Guard, & Dirty Filter Switch
CA	CPC Controller with Dirty Filter Switch & Air Proving Switch
CB	CPC Controller, DFS, APS & Phase Monitor
CC	CPC Controller, DFS, APS & Coil Guard
CD	CPC Controller, DFS, APS, Phase Monitor, & Coil Guard
CE	CPC Controller, DFS, APS & Technicoat Cond. Coil
CF	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
CG	CPC Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
CH	CPC Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
CJ	CPC Controller, DFS, APS & Technicoat Evap. Coil
CK	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
CL	CPC Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
CM	CPC Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
CN	CPC Controller, DFS, APS & Technicoat Evap. & Cond Coils
CP	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
CQ	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
CR	CPC Controller, DFS, APS, Technicoat Cond Coils, Phase Monitor, & 2” Pleated Filters
CV	CPC Controller, DFS, APS, & 2” Pleated Filters
CX	CPC Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, Coil Guard
HA	Honeywell Excel 10 Controller with Dirty Filter Switch & Air Proving Switch
HB	Honeywell Excel 10 Controller, DFS, APS & Phase Monitor
HC	Honeywell Excel 10 Controller, DFS, APS & Coil Guard
HD	Honeywell Excel 10 Controller, DFS, APS, Phase Monitor, & Coil Guard
HE	Honeywell Excel 10 Controller, DFS, APS & Technicoat Cond. Coil
HF	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
HG	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
HH	Honeywell Excel 10 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
HJ	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. Coil
HK	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
HL	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
HM	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard

HN	Honeywell Excel 10 Controller, DFS, APS & Technicoat Evap. & Cond Coils
HP	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
HQ	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
HR	Honeywell Excel 10 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
JA	Johnson UNT Controller with Dirty Filter Switch & Air Proving Switch
JB	Johnson UNT Controller, DFS, APS & Phase Monitor
JC	Johnson UNT Controller, DFS, APS & Coil Guard
JD	Johnson UNT Controller, DFS, APS, Phase Monitor, & Coil Guard
JE	Johnson UNT Controller, DFS, APS & Technicoat Cond. Coil
JF	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
JG	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
JH	Johnson UNT Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
JJ	Johnson UNT Controller, DFS, APS & Technicoat Evap. Coil
JK	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
JL	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
JM	Johnson UNT Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
JN	Johnson UNT Controller, DFS, APS & Technicoat Evap. & Cond Coils
JP	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
JQ	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
JR	Johnson UNT Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
NA	Novar ETC-3 Controller with Dirty Filter Switch & Air Proving Switch
NB	Novar ETC-3 Controller, DFS, APS & Phase Monitor
NC	Novar ETC-3 Controller, DFS, APS & Coil Guard
ND	Novar ETC-3 Controller, DFS, APS, Phase Monitor, & Coil Guard
NE	Novar ETC-3 Controller, DFS, APS & Technicoat Cond. Coil
NF	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Phase Monitor
NG	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, & Coil Guard
NH	Novar ETC-3 Controller, DFS, APS, Technicoat Cond. Coil, Phase Monitor, & Coil Guard
NJ	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. Coil
NK	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Phase Monitor
NL	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, & Coil Guard
NM	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. Coil, Phase Monitor, & Coil Guard
NN	Novar ETC-3 Controller, DFS, APS & Technicoat Evap. & Cond Coils
NP	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Phase Monitor
NQ	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, & Coil Guard
NR	Novar ETC-3 Controller, DFS, APS, Technicoat Evap. & Cond Coils, Phase Monitor, & Coil Guard
TA	Technicoat Condenser Coil
TB	Technicoat Condenser Coil & Phase Monitor
TC	Technicoat Condenser Coil & Coil Guard
TD	Technicoat Condenser Coil & Dirty Filter Switch

TE	Technicoat Condenser Coil, Phase Monitor, & Coil Guard
TF	Technicoat Condenser Coil, Phase Monitor, & Dirty Filter Switch
TG	Technicoat Condenser Coil, Coil Guard, & Dirty Filter Switch
TH	Technicoat Condenser Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch
TJ	Technicoat Evaporator Coil
TK	Technicoat Evaporator Coil & Phase Monitor
TL	Technicoat Evaporator Coil & Coil Guard
TM	Technicoat Evaporator Coil & Dirty Filter Switch
TN	Technicoat Evaporator Coil, Phase Monitor, & Coil Guard
TP	Technicoat Evaporator Coil, Phase Monitor, & Dirty Filter Switch
TQ	Technicoat Evaporator Coil, Coil Guard, & Dirty Filter Switch
TR	Technicoat Evaporator Coil, Phase Monitor, Coil Guard, & Dirty Filter Switch
TS	Technicoat Evaporator & Condenser Coils
TT	Technicoat Evaporator & Condenser Coils & Phase Monitor
TU	Technicoat Evaporator & Condenser Coils & Coil Guard
TV	Technicoat Evaporator & Condenser Coils & Dirty Filter Switch
TW	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Coil Guard
TX	Technicoat Evaporator & Condenser Coils, Phase Monitor, & Dirty Filter Switch
TY	Technicoat Evaporator & Condenser Coils, Coil Guard, & Dirty Filter Switch
TZ	Technicoat Evaporator & Condenser Coils, Phase Monitor, Coil Guard, & Dirty Filter Switch

INSTALLATION

INSTALLATION SAFETY INFORMATION

Read these instructions before continuing this appliance installation. This is an outdoor combination heating and cooling unit. The installer must assure that these instructions are made available to the consumer and with instructions to retain them for future reference.

1. Install this furnace only in a location and position as specified on Page 11 of these instructions.
2. This equipment is not to be used for temporary heating of buildings or structures under construction.

PRECEDING INSTALLATION

1. Remove the two screws holding the brackets in the front, rear and compressor side fork-lift slots.

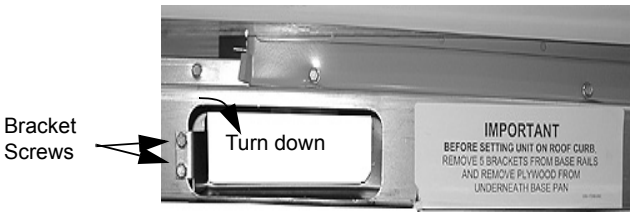


FIGURE 1 - UNIT SHIPPING BRACKET

2. Turn each bracket toward the ground and the protective plywood covering will drop to the ground.
3. Remove the condenser coil external protective covering prior to operation.
4. Remove the toolless doorknobs and instruction packet prior to installation.

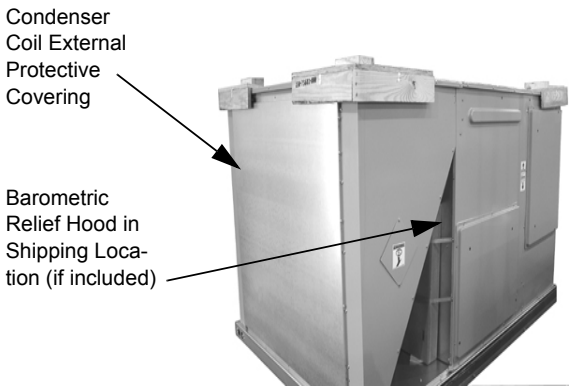


FIGURE 2 - CONDENSER COVERING

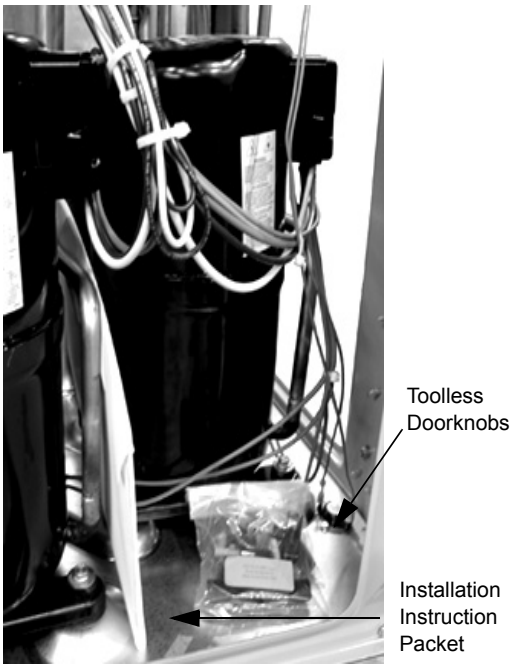


FIGURE 3 - COMPRESSOR SECTION

LIMITATIONS

These units must be installed in accordance with the following:

In U.S.A.:

1. National Electrical Code, ANSI/NFPA No. 70 - Latest Edition
2. Local building codes, and
3. Local plumbing and waste water codes, and
4. Other applicable local codes.

Refer to Tables 1 & 2 for unit application data.

If components are to be added to a unit to meet local codes, they are to be installed at the dealer's and/or customer's expense.

Size of unit for proposed installation should be based on heat loss/heat gain calculation made according to the methods of Air Conditioning Contractors of America (ACCA).

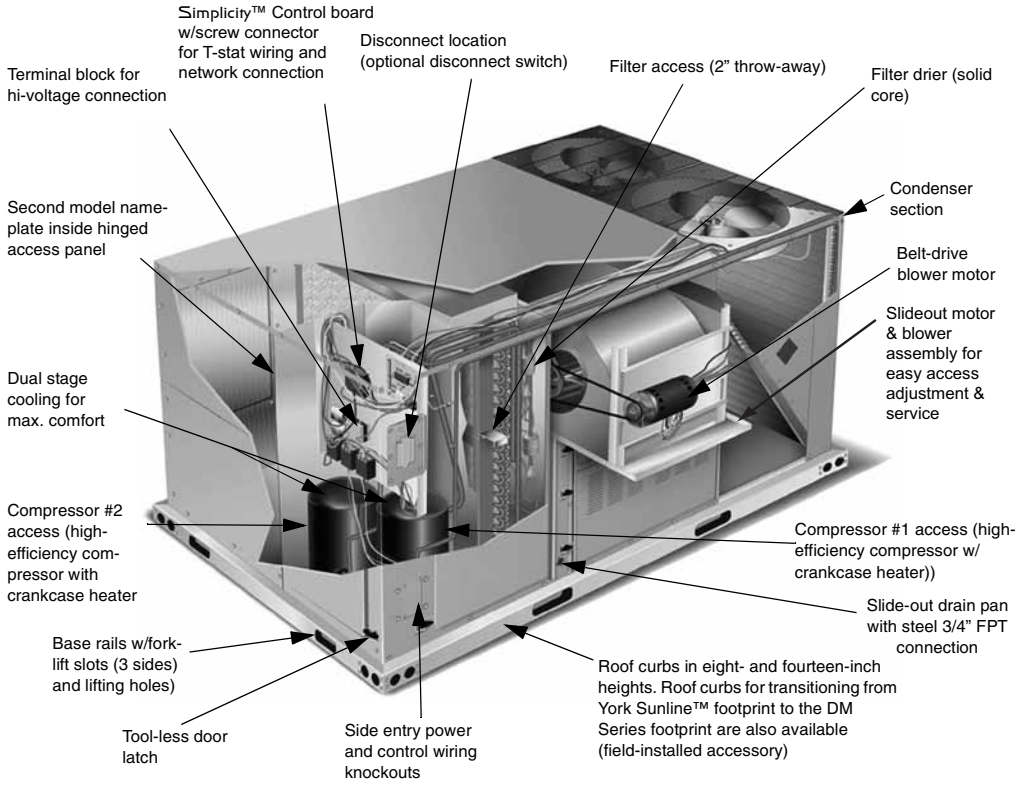

Simplicity™ Control board w/screw connector for T-stat wiring and network connection
Disconnect location (optional disconnect switch)
Filter access (2" throw-away)
Filter drier (solid core)
Terminal block for hi-voltage connection
Condenser section
Second model name-plate inside hinged access panel
Belt-drive blower motor
Slideout motor & blower assembly for easy access adjustment & service
Dual stage cooling for max. comfort
Compressor #2 access (high-efficiency com-pressor with crankcase heater
Compressor #1 access (high-efficiency compressor w/ crankcase heater))
Slide-out drain pan with steel 3/4" FPT connection
Base rails w/fork-lift slots (3 sides) and lifting holes)
Roof curbs in eight- and fourteen-inch heights. Roof curbs for transitioning from York Sunline™ footprint to the DM Series footprint are also available (field-installed accessory)
Tool-less door latch
Side entry power and control wiring knockouts

FIGURE 4 - PREDATOR® COMPONENT LOCATION

TABLE 1: UNIT VOLTAGE LIMITATIONS

Power Rating	Minimum	Maximum
380	350	418

TABLE 2: UNIT TEMPERATURE LIMITATIONS

Temperature	Min.	Max.
Wet Bulb Temperature (°F) of Air on Evaporator Coil	57	72
Dry Bulb Temperature (°F) of Air on Condenser Coil	0*	125

*. A low ambient accessory is available for operation down to -20°F.

LOCATION

Use the following guidelines to select a suitable location for these units:

1. Unit is designed for *outdoor installation only*.
2. Condenser coils must have an unlimited supply of air. Where a choice of location is possible, position the unit on either north or east side of building.
3. Suitable for mounting on roof curb.
4. For ground level installation, use a level concrete slab with a minimum thickness of 4 inches. The length and width should be at least 6 inches greater than the unit base rails. Do not tie slab to the building foundation.
5. Roof structures must be able to support the weight of the unit and its options/accessories. Unit must be installed on a solid, level roof curb or appropriate angle iron frame.
6. Maintain level tolerance to 1/2" across the entire width and length of unit.

RIGGING AND HANDLING

Exercise care when moving the unit. Do not remove any packaging until the unit is near the place of installation. Rig the unit by attaching chain or cable slings to the lifting holes provided in the base rails. Spreader bars, whose length exceeds the largest dimension across the unit, **MUST** be used across the top of the unit.

⚠ CAUTION

If a unit is to be installed on a roof curb other than a YORK roof curb, gasketing must be applied to all surfaces that come in contact with the unit underside.

⚠ CAUTION

Before lifting, make sure the unit weight is distributed equally on the rigging cables so it will lift evenly.

Units may be moved or lifted with a forklift. Slotted openings in the base rails are provided for this purpose.

LENGTH OF FORKS MUST BE A MINIMUM OF 60 INCHES.

⚠ CAUTION

All panels must be secured in place when the unit is lifted.

The condenser coils should be protected from rigging cable damage with plywood or other suitable material.

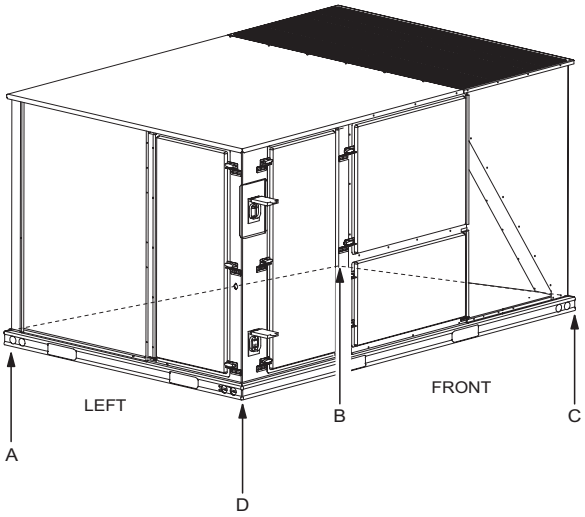


FIGURE 5 - UNIT 4 POINT LOAD

TABLE 3: UNIT WEIGHTS

Model	Shipping Weight* (lb.)	Operating Weight† (lb.)
DM090	1056	1051
DM120	1121	1116
DM150	1200	1195
Econ.	85	84
w/ PE	150	148
Elec. Heat[2]	49	49

*. Weights include largest gas heat option.

†. 54kW heater.

TABLE 4: 6 POINT LOAD WEIGHT

Model	Location (lbs.)*					
	A	B	C	D	E	F
DM090	158	142	128	187	207	230
DM120	168	151	136	198	219	244
DM150	180	161	145	212	235	262

*. Weights include largest gas heat option.

TABLE 5: 4 POINT LOAD WEIGHT

Model	Location (lbs.)*			
	A	B	C	D
DM090	230	197	287	336
DM120	245	209	305	357
DM150	262	224	327	382

*. Weights include largest gas heat option.

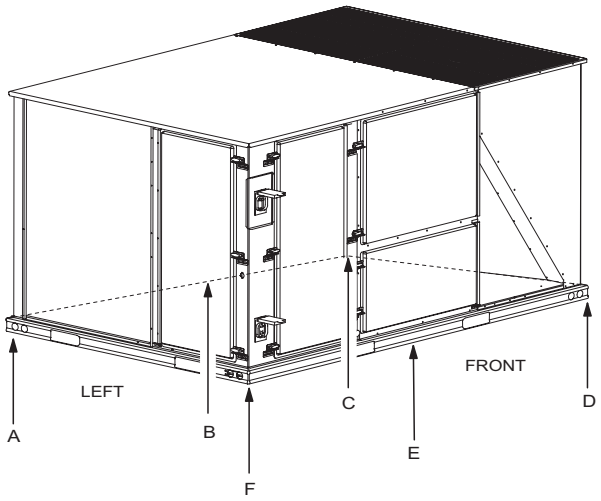


FIGURE 6 - UNIT 6 POINT LOAD

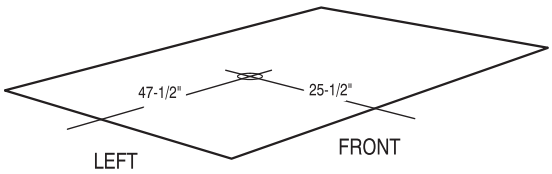


FIGURE 7 - UNIT CENTER OF GRAVITY

CLEARANCES

All units require particular clearances for proper operation and service. Installer must make provisions for adequate ventilation air in accordance with applicable provisions of the local building codes. Refer to Table 6 for clearances required for combustible construction, servicing, and proper unit operation.

⚠WARNING

Do not permit overhanging structures or shrubs to obstruct condenser air discharge outlet, combustion air inlet or vent outlets.

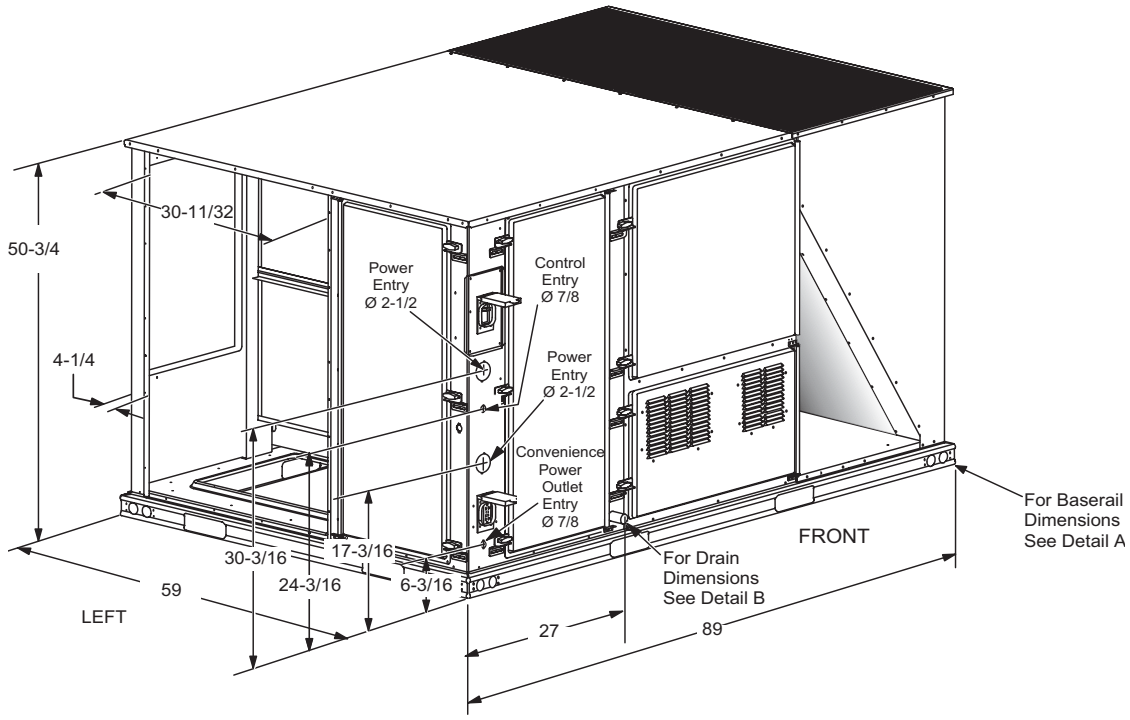


FIGURE 8 - UNIT DIMENSIONS

TABLE 6: UNIT CLEARANCES

Top*	72”	**Right**	12”
Front	36”	**Left**	36”
Rear†	36”	**Bottom‡**	0”

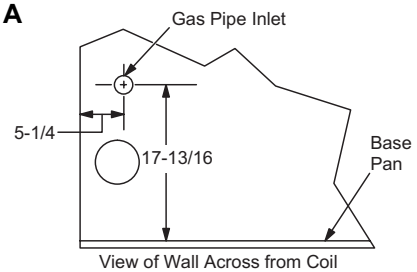
*. Units must be installed outdoors. Overhanging structure or shrubs should not obstruct condenser air discharge outlet.

†. To remove the slide-out drain pan, a rear clearance of sixty inches is required. If space is unavailable, the drain pan can be removed through the front by separating the corner wall.

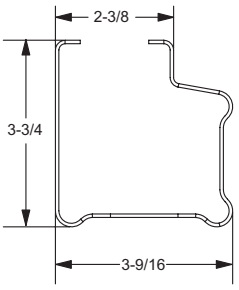
‡. Units may be installed on combustible floors made from wood or class A, B or C roof covering materials.

NOTE: A one-inch clearance must be provided between any combustible material and the supply ductwork for a distance of 3 feet from the unit.

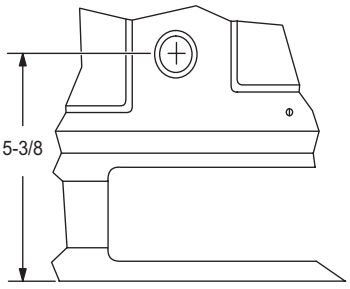
DETAIL A



DETAIL B



DETAIL C



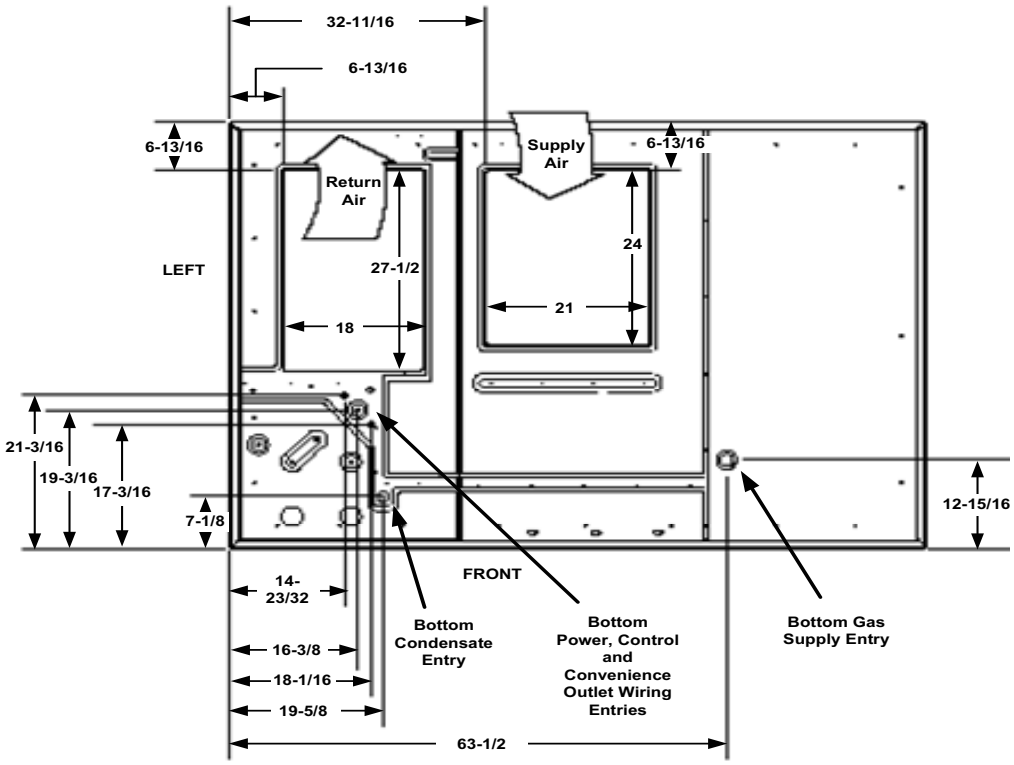


FIGURE 9 - BOTTOM DUCT OPENINGS (FROM ABOVE)

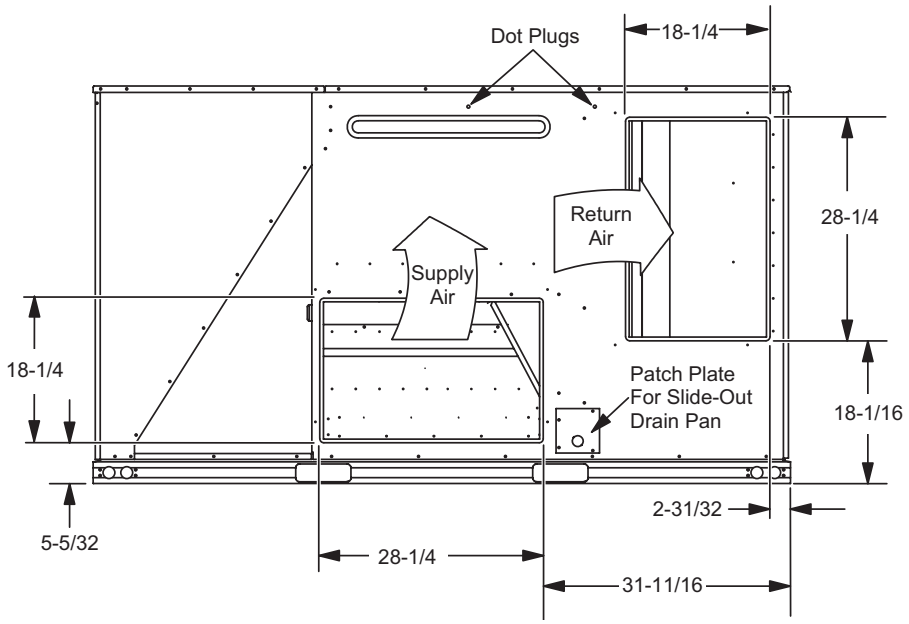


FIGURE 10 - REAR DUCT DIMENSIONS

DUCTWORK

Ductwork should be designed and sized according to the methods in Manual D of the Air Conditioning Contractors of America (ACCA) or as recommended by any other recognized authority such as ASHRAE or SMACNA.

A closed return duct system should be used. This will not preclude use of economizers or outdoor fresh air intake. The supply and return air duct connections at the unit should be made with flexible joints to minimize noise.

The supply and return air duct systems should be designed for the CFM and static pressure requirements of the job. They should NOT be sized to match the dimensions of the duct connections on the unit.

Refer to 9 for bottom air duct openings. Refer to Figure 10 for rear air duct openings.

DUCT COVERS

Units are shipped with the side duct openings covered and a covering over the bottom of the unit. For bottom duct application, no duct cover changes are necessary. For side duct application, remove the side duct covers and install over the bottom duct openings. The panels removed from the side duct connections are designed to be reused by securing each panel to its respective downflow opening. But keep in mind that the supply panel is installed with the painted surface UP, facing the heat exchanger, while the return panel is installed with the painted surface DOWN, facing the downflow duct opening. The supply panel is secured with the bracket (already in place from the factory) and two screws. It's a snug fit for the panel when sliding it between the heat exchanger and unit bottom, but there is room. The return panel is secured with four screws.

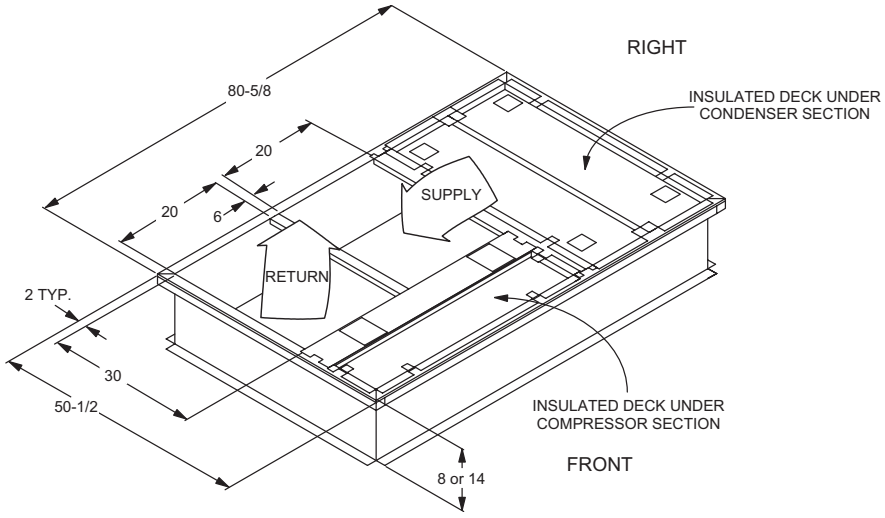


FIGURE 11 - PREDATOR® ROOF CURB DIMENSIONS

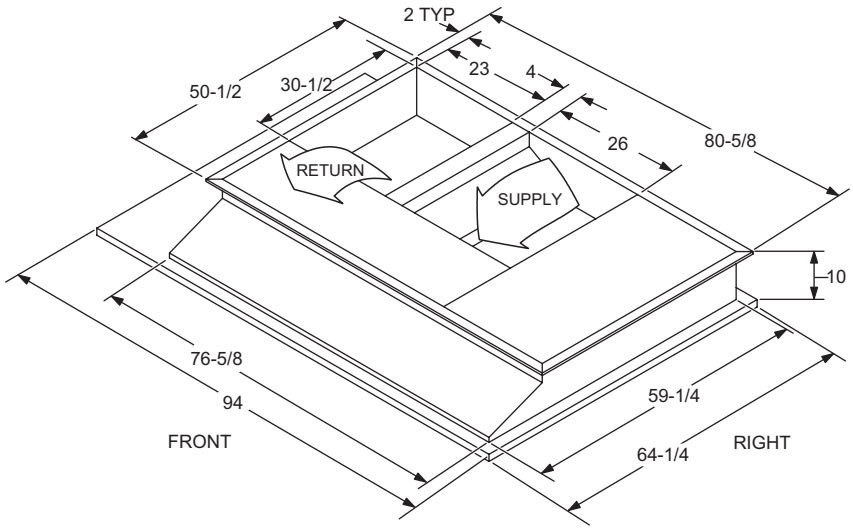


FIGURE 12 - SUNLINE™ TO PREDATOR® TRANSITION ROOF CURBS

⚠ CAUTION

When fastening ductwork to side duct flanges on unit, insert screws through duct flanges only. DO NOT insert screws through casing. Outdoor ductwork must be insulated and water-proofed.

FIGURE 13 - SIDE PANELS WITH HOLE PLUGS

Note orientation. Panel is “insulation” side up.

FIGURE 14 - RETURN DOWNFLOW PLENUM WITH PANEL

FIGURE 15 - DISCHARGE PANEL IN PLACE

CONDENSATE DRAIN

The side condensate drain is reversible and maybe re-oriented to the rear of the cabinet to facilitate condensate piping. A condensate drain connection is available through the base pan for piping inside the roof curb. Trap the connection per Figure 16. The trap and drain lines should be protected from freezing.

Plumbing must conform to local codes. Use a sealing compound on male pipe threads. Install condensate drain line from the 3/4 inch NPT female connection on the unit to an open drain.

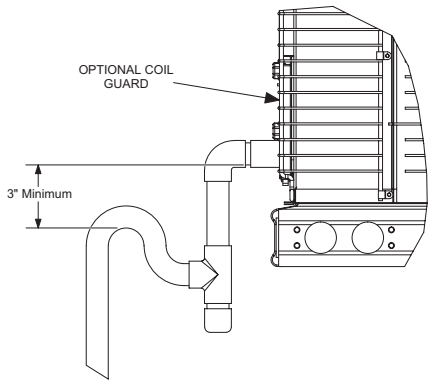


FIGURE 16 - CONDENSATE DRAIN

COMPRESSORS

The compressors are mounted on elastomer insulators. The mounting bolts have been fully tightened for shipping.

⚠ CAUTION

Do not loosen the compressor mounting bolts.

FILTERS

Two-inch filters are supplied with each unit. One-inch filters may be used with no modification to the filter racks. Filters must always be installed ahead of evaporator coil and must be kept clean or replaced with same size and type. Dirty filters reduce the capacity of the unit and result in frosted coils or safety shutdown. All units use four (4) 20”x25”x2” filters. The unit should not be operated without filters properly installed.

⚠ CAUTION

Make sure that panel latches are properly positioned on the unit to maintain an airtight seal.

THERMOSTAT WIRING

The thermostat should be located on an inside wall approximately 56 inches above the floor where it will not be subject to drafts, sun exposure or heat from electrical fixtures or appliances. Follow the manufacturer's instructions enclosed with thermostat for general installation procedure. Seven (7) color-coded, insulated wires should be used to connect the thermostat to the unit. Refer to Table 7 for control wire sizing and maximum length.

TABLE 7: CONTROL WIRE SIZES

Wire Size	Maximum Length*
18 AWG	150 Feet

*. From the unit to the thermostat and back to the unit.

POWER AND CONTROL WIRING

Field wiring to the unit, fuses, and disconnects must conform to provisions of National Electrical Code (NEC), ANSI/NFPA No. 70 – Latest Edition (in U.S.A.), current Canadian Electrical Code C221, and/or local ordinances. The unit must be electrically grounded in accordance with NEC and CEC as specified above and/or local codes.

Voltage tolerances which must be maintained at the compressor terminals during starting and running conditions are indicated on the unit Rating Plate and Table 1.

The internal wiring harnesses furnished with this unit are an integral part of the design certified unit. Field alteration to comply with electrical codes should not be required. If any of the wire supplied with the unit must be replaced, replacement wire must be of the type shown on the wiring diagram and the same minimum gauge as the replaced wire.

A disconnect must be utilized for these units. Factory installed disconnects are available. If installing a disconnect (field supplied or York International® supplied accessory), refer to Figure 4 for the recommended mounting location.

⚠ CAUTION

Avoid damage to internal components if drilling holes for disconnect mounting.

NOTE: Since not all local codes allow the mounting of a disconnect on the unit, please confirm compliance with local code before mounting a disconnect on the unit.

Electrical line must be sized properly to carry the load. USE COPPER CONDUCTORS ONLY. Each unit must be wired with a separate branch circuit fed directly from the meter panel and properly fused.

Refer to Figures 17, 18 and 19 for typical field wiring and to the appropriate unit wiring diagram mounted inside control doors for control circuit and power wiring information.

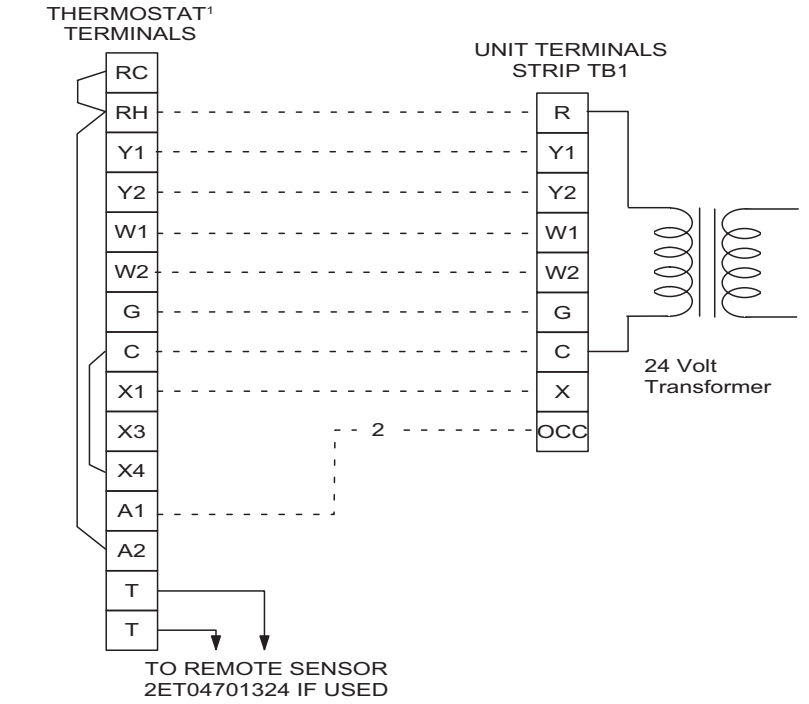
⚠ CAUTION

When connecting electrical power and control wiring to the unit, water-proof connectors must be used so that water or moisture cannot be drawn into the unit during normal operation. The above water-proofing conditions will also apply when installing a field supplied disconnect switch.

POWER WIRING DETAIL

Units are factory wired for the voltage shown on the unit nameplate. Refer to Electrical Data Tables 8 through 13 size power wiring, fuses, and disconnect switch.

Power wiring is brought into the unit through the side of the unit or the basepan inside the curb.



[1] Electronic programmable Thermostat 2ET0770010024 (includes subbase).
[2] Terminals A1 and A2 provide a relay output to close the outdoor economizer dampers when the thermostat switches to the set-back position.

FIGURE 17 - ELECTRONIC THERMOSTAT FIELD WIRING

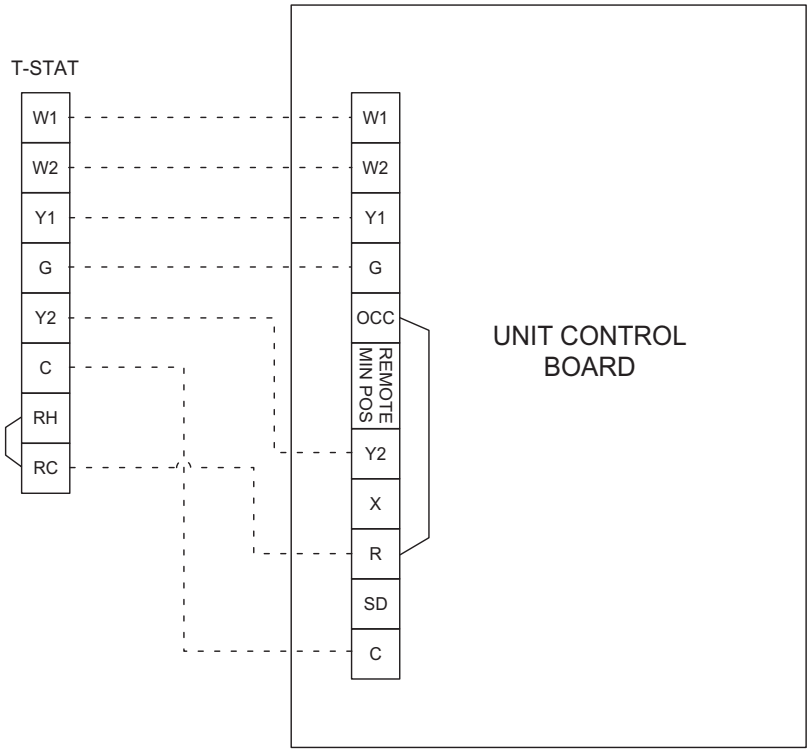


FIGURE 18 - FIELD WIRING 24 VOLT THERMOSTAT

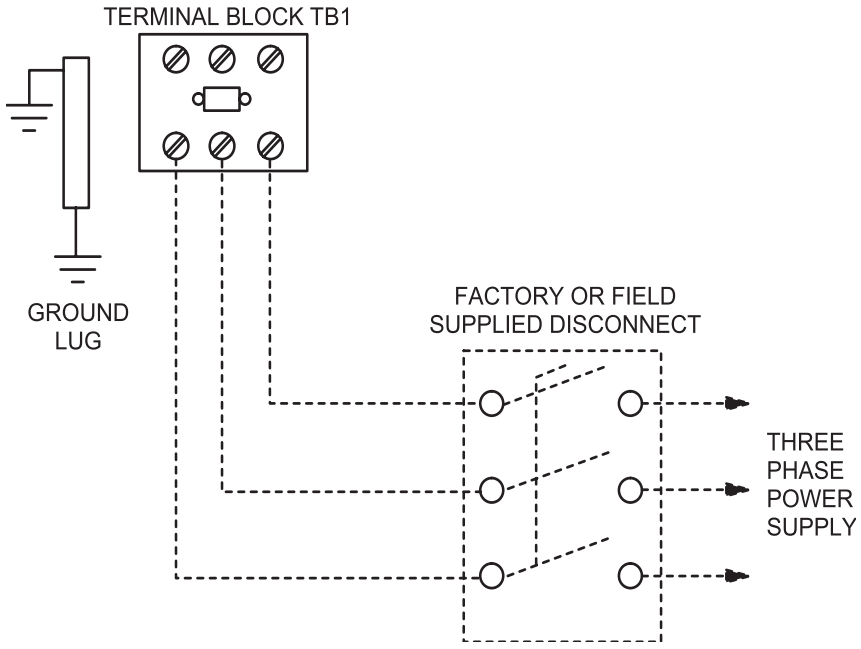


FIGURE 19 - FIELD WIRING DISCONNECT

TABLE 8: ELECTRICAL DATA - DM090 (7-1/2 TON) WITHOUT POWER CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse* Size w/Power Exhaust	
	RLA ea.	LRA ea.	FLA ea.	1.5 HP	2 HP	FLA	FLA				1.5 HP	2 HP	1.5 HP	2 HP	1.5 HP	2 HP	1.5 HP	2 HP
380	7.1	54.0	0.8	3.1	4.1	2.2	0.0	None	--	--	20.7	21.7	22.9	23.9	25	25	25	30
								2TP04520950	5.6	8.5	20.7	21.7	22.9	23.9	25	25	25	30
								2TP04521850	11.3	17.2	25.3	26.6	28.1	29.3	30	30	30	30
								2TP04522450	15	22.8	32.4	33.6	35.1	36.4	35	35	40	40
								2TP04523650	21.3	32.4	44.3	45.6	47.1	48.3	45	50	50	50

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 9: ELECTRICAL DATA - DM090 (7-1/2 TON) WITH POWER CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse* Size w/Power Exhaust	
	RLA ea.	LRA ea.	FLA ea.	1.5 HP	2 HP	FLA	FLA				1.5 HP	2 HP	1.5 HP	2 HP	1.5 HP	2 HP	1.5 HP	2 HP
380	7.1	54.0	0.8	3.1	4.1	2.2	6.3	None	--	--	27	28	29.2	30.2	30	35	35	35
								2TP04520950	5.6	8.5	27	28	29.2	30.2	30	35	35	35
								2TP04521850	11.3	17.2	33.2	34.5	36	37.2	35	35	40	40
								2TP04522450	15	22.8	40.2	41.5	43	44.2	45	45	45	45
								2TP04523650	21.3	32.4	52.2	53.5	55	56.2	60	60	60	60

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 10: ELECTRICAL DATA - DM120 (10 TON) WITHOUT POWER CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse* Size w/Power Exhaust	
	RLA ea.	LRA ea.	FLA ea.	2 HP	3 HP	FLA	FLA				2 HP	3 HP	2 HP	3 HP	2 HP	3 HP	2 HP	3 HP
380	11.5	75.0	1.6	4.1	5.3	2.2	0.0	None	--	--	33.2	34.4	35.4	36.6	40	45	45	45
								2TP04521850	11.3	17.2	33.2	34.4	35.4	36.6	40	45	45	45
								2TP04522450	15	22.8	33.6	35.1	36.4	37.9	40	45	45	45
								2TP04523650	21.3	32.4	45.6	47.1	48.3	49.8	50	50	50	50
								2TP04525450	33.8	51.4	69.3	70.8	72.1	73.6	70	80	80	80

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 11: ELECTRICAL DATA - DM120 (10 TON) WITH POWER CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse* Size w/Power Exhaust	
	RLA ea.	LRA ea.	FLA ea.	2 HP	3 HP	FLA	FLA				2 HP	3 HP	2 HP	3 HP	2 HP	3 HP	2 HP	3 HP
380	11.5	75.0	1.6	4.1	5.3	2.2	6.3	None	--	--	39.5	40.7	41.7	42.9	50	50	50	50
								2TP04521850	11.3	17.2	39.5	40.7	41.7	42.9	50	50	50	50
								2TP04522450	15	22.8	41.5	43	44.2	45.7	50	50	50	50
								2TP04523650	21.3	32.4	53.5	55	56.2	57.7	60	60	60	60
								2TP04525450	33.8	51.4	77.2	78.7	79.9	81.4	80	80	80	90

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 12: ELECTRICAL DATA - DM150 (12-1/2 TON) WITHOUT POWER CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse* Size w/Power Exhaust	
	RLA ea.	LRA ea.	FLA ea.	3 HP	5 HP	FLA	FLA				3 HP	5 HP	3 HP	5 HP	3 HP	5 HP	3 HP	5 HP
380	12.2	88.0	1.6	5.3	8.1	2.2	0.0	None	--	--	36.0	38.8	38.2	41.0	45	50	50	50
								2TP045E11850	11.3	17.2	36.0	38.8	38.2	41.0	45	50	50	50
								2TP045E12450	15	22.8	36.0	38.8	38.2	41.4	45	50	50	50
								2TP045E13650	21.3	32.4	47.1	50.6	49.8	53.3	50	60	50	60
								2TP045E15450	33.8	51.4	70.8	74.3	73.6	77.1	80	80	80	80

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 13: ELECTRICAL DATA - DM150 (12-1/2 TON) WITH POWER CONVENIENCE OUTLET

Voltage	Compressors		OD Fan Motors	Supply Blower Motor FLA		Pwr Exh Motor	Pwr Conv Outlet	Electric Heater Model No.	Actual KW	Heater Amps	Min. Circuit Ampacity (Amps)		MCA w/Power Exhaust (Amps)		Max Fuse* Size (Amps)		Max Fuse* Size w/Power Exhaust	
	RLA ea.	LRA ea.	FLA ea.	3 HP	5 HP	FLA	FLA				3 HP	5 HP	3 HP	5 HP	3 HP	5 HP	3 HP	5 HP
380	12.2	88.0	1.6	5.3	8.1	2.2	6.3	None	--	--	42.3	45.1	44.5	47.3	50	50	50	50
								2TP045E11850	11.3	17.2	42.3	45.1	44.5	47.3	50	50	50	50
								2TP045E12450	15	22.8	43	46.5	45.7	49.2	50	50	50	50
								2TP045E13650	21.3	32.4	55	58.5	57.7	61.2	60	60	60	70
								2TP045E15450	33.8	51.4	78.7	82.2	81.4	84.9	80	90	90	90

* Maximum HACR breaker of the same AMP size is applicable.

TABLE 14: PHYSICAL DATA

Component			Models		
			090	120	150
Evaporator Blower	Blower, Centrifugal (Dia. X Wd. in.)		15 x 15	15 x 15	15 x 15
	Motor, Standard (HP)		1-1/2	2	3
	Motor, Optional (HP)		2	3	5
Evaporator Coil	DM	Rows	2	2	3
		Fins per Inch	15	15	15
		Height (in.)	32	40	40
		Face Area (ft.^{2} each)	10.6	13.2	13.2
Condenser Fan (2 per Unit)	DM	Propeller Dia. (in., each)	24	24	24
		Motor (HP, each)	1/3	3/4	3/4
		CFM, Nominal (each)	3400	4400	4400
Condenser Coil (2 per unit)	DM	Rows (each)	1	1	2
		Fins per Inch	20	20	20
		Height (in. each)	28	44	44
		Face Area (ft.^{2} each)	9.2	14.5	14.5
Refrigerant Charge	DM	System 1 (lb./oz.)	4/12	6/12	10/12
		System 2 (lb./oz.)	4/6	6/12	11/0
Compressors	DM	Quantity	2	2	2
		Type	Recip	Recip	Scroll
Air Filters	Size (Wd. x Ht. x Thickness in.)		25x20x2	25x20x2	25x20x2
	Number Per Unit		4	4	4

OPTIONS/ACCESSORIES

ELECTRIC HEAT ACCESSORIES

Electric heaters are available as field installed accessories. Refer to electric heat instructions for installation. These heaters mount in the heat compartment with the heating elements extending into the supply air chamber. All electric heaters are fused and intended for use with single point power supply.

ELECTRIC HEAT OPTION

The factory-installed heaters are wired for single point power supply. Power supply need only be brought into the single point terminal block.

These CSA approved heaters are located within the central compartment of the unit with the heater elements extending into the supply air chamber.

Fuses are supplied, where required, by the factory. Some kW sizes require fuses and other do not. Refer to Table 15 for minimum CFM limitations and to Tables 8 through 13 for electrical data.

TABLE 15: MINIMUM SUPPLY AIR CFM

Heater	Unit Model Size, Nominal Tons			
kW	Voltage	7.5	10	12.5
		Minimum Supply Air CFM		
9	380	2250	N/A	N/A
18		2250	3000	3750
24		2250	3000	3750
36		2250	3000	3750
54		N/A	3000	3750

MOTORIZED OUTDOOR DAMPER

The Motorized Outdoor Damper can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Motorized Outdoor Damper accessories include complete instructions for installation.

ECONOMIZER

The Economizer can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Economizer accessories include complete instructions for installation.

There are two Economizer options:

1. Down Flow application with barometric relief hood standard.
2. Horizontal Flow application that requires the purchase of a barometric relief hood.

POWER EXHAUST

The Power Exhaust can be a factory installed option or a field installed accessory. If factory installed, refer to the instructions included with the outdoor air hood to complete the assembly. Field installed Power Exhaust accessories include complete instructions for installation.

The Power Exhaust factory installed option is for Down Flow application only.

There are two field installed Power Exhaust accessories:

1. Down Flow application.
2. Horizontal Flow application that requires the purchase of a barometric relief hood.

RAIN HOOD

All of the hood components, including the filters, the gasketing and the hardware for assembling, are packaged and located between the condenser coil section and the main unit cabinet, if the unit has factory installed options. If field installed accessories are being installed all parts necessary for the installation comes in the accessory.

ECONOMIZER AND POWER EXHAUST SET POINT ADJUSTMENTS AND INFORMATION

Remove the top rear access panel from the unit. Locate the economizer control module, where the following adjustments will be made.

⚠ CAUTION

Extreme care must be exercised in turning all set point, maximum and minimum damper positioning adjustment screws to prevent twisting them off.

MINIMUM POSITION ADJUSTMENT

- Check that the damper blades move smoothly without binding; carefully turn the Minimum Position Adjust screw (found on the damper control module) fully clockwise and then set the thermostat indoor fan switch to the ON position and then OFF or energize and de-energize terminals “R” to “G”.
- With the thermostat set to the indoor fan ON position or terminals “R” to “G” energized, turn the Minimum Position Adjusting screw (located on the damper control module) counterclockwise until the desired minimum damper position has been attained.

ENTHALPY SET POINT ADJUSTMENT

The enthalpy set point may now be set by selecting the desired set point shown in the Enthalpy Set Point Adjustment Figure 20. Adjust as follows:

- For a single enthalpy operation carefully turn the set point adjusting screw (found on the damper control module) to the "A", "B", "C" or "D" setting corresponding to the lettered curve of the Enthalpy Set Point Adjustment Figure 20.
- For a dual enthalpy operation, carefully turn the set point adjusting screw fully clockwise past the "D" setting.

POWER EXHAUST DAMPER SET POINT (WITH OR WITHOUT POWER EXHAUST)

- With no power exhaust option, adjust the Exhaust Air Adjustment Screw fully clockwise. This will allow 2nd stage cooling to operate.
- With power exhaust option, each building pressurization requirement will be different. The point at which the power exhaust comes on is determined by the economizer damper position (Percent Open). The Exhaust Air Adjustment Screw should be set at the Percent Open of the economizer damper at which the power exhaust is needed. It can be set from 0 to 100% damper open.

INDOOR AIR QUALITY AQ

Indoor Air Quality (indoor sensor input): Terminal AQ accepts a +2 to +10 Vdc signal with respect to the (AQ1) terminal. When the signal is below it's set point, the actuator is allowed to modulate normally in accordance with the enthalpy and mixed air sensor inputs. When the AQ signal exceeds it's set point setting and there is no call for free cooling, the actuator is proportionately modulated from the 2 to 10 Vdc signal, with 2 Vdc corresponding to full closed and 10 Vdc corresponding to full open. When there is no call for free cooling, the damper position is limited by the IAQ Max damper position setting. When the signal exceeds it's set point (Demand Control Ventilation Set Point) setting and there is a call for free cooling, the actuator modulates from the minimum position to the full open position based on the highest call from either the mixed air sensor input or the AQ voltage input.

- Optional CO_2 Space Sensor Kit Part # 2AQ04700324
- Optional CO_2 Sensor Kit Part # 2AQ04700424

Replace the top rear access panel on the unit.

CONTROL CURVE	CONTROL POINT APPROX. ^{0}F (^{0}C) AT 50% RH
A	73 (23)
B	70 (21)
C	67 (19)
D	63 (17)

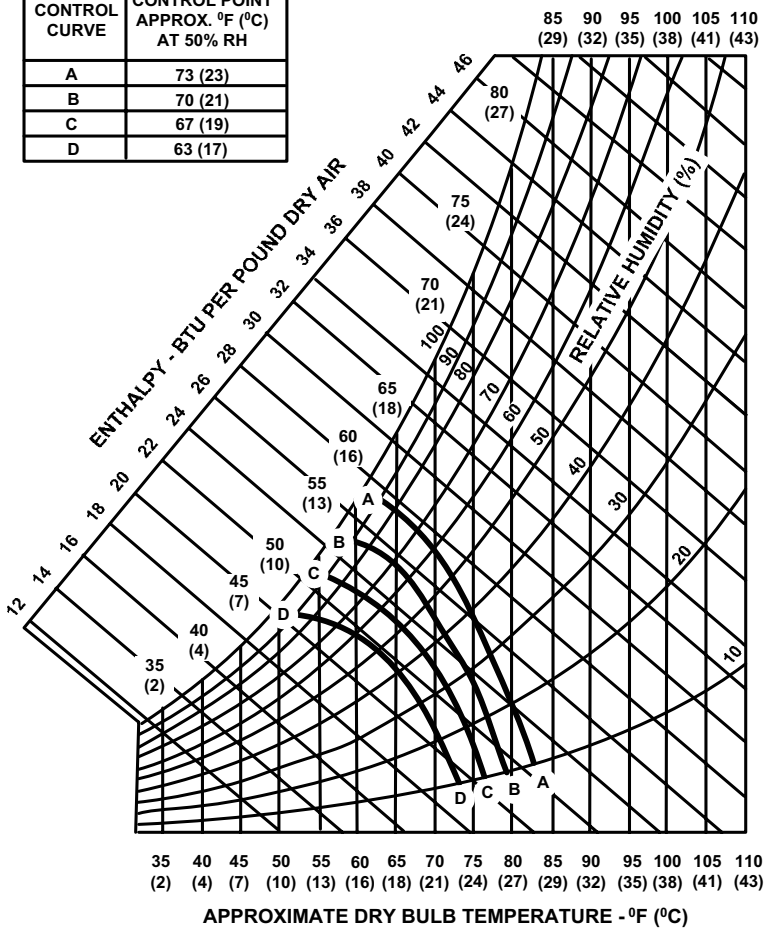


FIGURE 20 - ENTHALPY SET POINT CHART

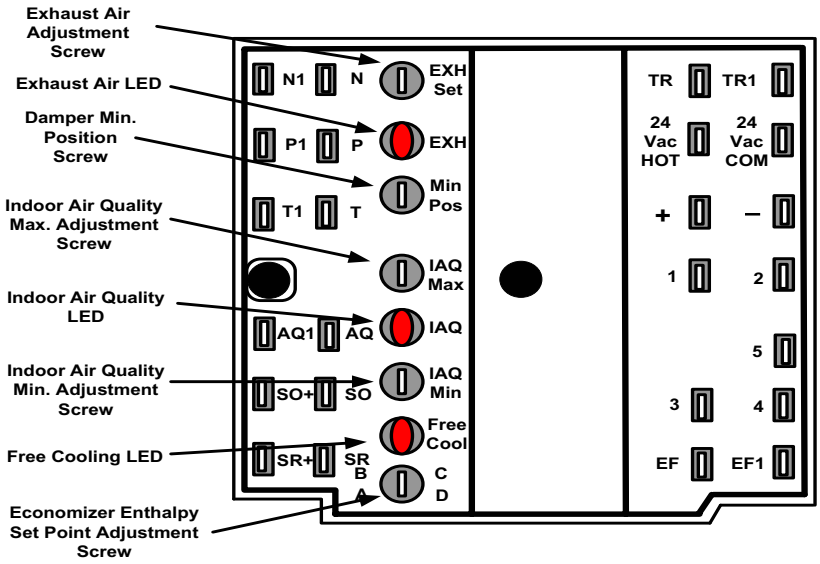


FIGURE 21 - HONEYWELL ECONOMIZER CONTROL W7212

PHASING

Predator® units are properly phased at the factory. Check for proper compressor rotation. If the blower or compressors rotate in the wrong direction at start-up, the electrical connection to the unit is misphased. Change the phasing of the **Field Line Connection at the factory or field supplied disconnect** to obtain proper rotation. (Scroll compressors operate in only one direction. If the scroll is drawing low amperage, has similar suction and discharge pressures, or producing a high noise level, the scroll is misphased.)

⚠ CAUTION

Scroll compressors require proper rotation to operate correctly. Units are properly phased at the factory. Do not change the internal wiring to make the blower condenser fans, or compressor rotate correctly.

BLOWER ROTATION

Check for proper supply air blower rotation. If the blower is rotating backwards, the line voltage at the unit point of power connection is misphased (See 'PHASING').

TABLE 16: SUPPLY AIR LIMITATIONS

Unit Size	Minimum	Maximum
090	2250	3750
120	3000	5000
150	3750	6250

BELT TENSION

The tension on the belt should be adjusted as shown in Figure 22.

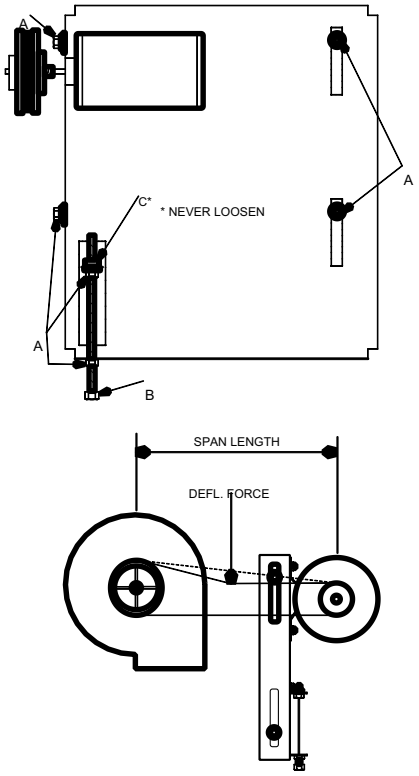


FIGURE 22 - BELT ADJUSTMENT

⚠ CAUTION

Procedure for adjusting belt tension:

1. Loosen six nuts (top and bottom) A.
2. Adjust by turning (B).
3. Never loosen nuts (C).
4. Use belt tension checker to apply a perpendicular force to one belt at the midpoint of the span as shown. Deflection distance of 4mm (5/32") is obtained.

To determine the deflection distance from normal position, use a straight edge from sheave to sheave as reference line. The recommended deflection force is as follows:

Tension new belts at the max. deflection force recommended for the belt section. Check the belt tension at least two times during the first 24 hours of operation. Any retensioning should fall between the min. and max. deflection force values.

5. After adjusting retighten nuts (A).

TABLE 17: 7-1/2 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	3715	1573	1.69	3634	1434	1.54	3431	1265	1.36	3218	901	0.97	3024	976	1.05
0.4	3650	1657	1.78	3510	1490	1.60	3320	1313	1.41	3079	1145	1.23	2832	810	0.87	2586	860	0.92
0.6	3334	1522	1.63	3146	1351	1.45	2910	1169	1.25	2621	1005	1.08	2307	706	0.76	-	-	-
0.8	2903	1352	1.45	2622	1167	1.25	2404	1013	1.09	2054	858	0.92	-	-	-	-	-	-
1.0	2356	1159	1.24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 18: 7-1/2 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	-	-	-	-	-	-	-	-	-	3992	1904	2.04	3798	1679	1.80
0.4	-	-	-	-	-	-	-	-	-	3930	2017	2.16	3734	1786	1.92	3486	1552	1.66
0.6	-	-	-	-	-	-	3947	2176	2.33	3670	1895	2.03	3394	1641	1.76	3084	1401	1.50
0.8	-	-	-	4138	2384	2.56	3623	2009	2.15	3323	1742	1.87	2971	1477	1.58	2591	1236	1.33
1.0	4126	2430	2.61	3643	2145	2.30	3224	1820	1.95	2889	1569	1.68	2466	1306	1.40	-	-	-
1.2	3613	2238	2.40	3143	1921	2.06	2748	1621	1.74	2369	1385	1.49	-	-	-	-	-	-
1.4	3099	2039	2.19	2636	1714	1.84	2195	1424	1.53	-	-	-	-	-	-	-	-	-
1.6	2586	1833	1.97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 19: 10 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	-	-	-	-	-	-	3896	1639	1.76	3688	1453	1.56	3447	1268	1.36
0.4	4040	2076	2.23	4005	1934	2.07	3790	1698	1.82	3569	1508	1.62	3333	1330	1.43	3057	1147	1.23
0.6	3890	2006	2.15	3697	1790	1.92	3427	1550	1.66	3152	1356	1.45	-	-	-	-	-	-
0.8	3620	1882	2.02	3324	1629	1.75	2972	1380	1.48	-	-	-	-	-	-	-	-	-
1.0	3227	1708	1.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 20: 10 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	4965	3485	3.74	4875	3150	3.38	4613	2739	2.94	4322	2374	2.55	4156	2106	2.26	3907	1860	1.99
0.6	4876	3416	3.66	4651	2997	3.21	4359	2582	2.77	4038	2220	2.38	3860	1966	2.11	3590	1724	1.85
0.8	4713	3291	3.53	4387	2823	3.03	4077	2417	2.59	3719	2059	2.21	3541	1827	1.96	3242	1584	1.70
1.0	4476	3116	3.34	4084	2632	2.82	3768	2245	2.41	3365	1892	2.03	3197	1691	1.81	-	-	-
1.2	4165	2898	3.11	3741	2427	2.60	3432	2070	2.22	-	-	-	-	-	-	-	-	-
1.4	3779	2646	2.84	3359	2212	2.37	3069	1895	2.03	-	-	-	-	-	-	-	-	-
1.6	3319	2372	2.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 21: 12-1/2 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	5078	3630	3.89	4809	3103	3.33	4594	3053	3.27	4360	2478	2.66	4090	2093	2.24	3812	1798	1.93
0.6	4865	3456	3.71	4584	2961	3.17	4349	2912	3.12	4106	2318	2.49	3814	1964	2.11	-	-	-
0.8	4642	3284	3.52	4356	2828	3.03	4089	2776	2.98	3840	2137	2.29	-	-	-	-	-	-
1.0	4408	3114	3.34	4124	2705	2.90	3815	2647	2.84	-	-	-	-	-	-	-	-	-
1.2	4164	2947	3.16	3889	2592	2.78	-	-	-	-	-	-	-	-	-	-	-	-
1.4	3910	2787	2.99	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 22: 12-1/2 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	5994	5400	5.79	5565	4369	4.69	5488	4169	4.47	5264	3599	3.86	4990	3085	3.31	4738	2812	3.02
0.6	5824	5216	5.59	5368	4186	4.49	5289	3991	4.28	5049	3437	3.69	4763	2937	3.15	4491	2655	2.85
0.8	5641	5022	5.39	5170	4012	4.30	5076	3807	4.08	4822	3272	3.51	4528	2790	2.99	4235	2497	2.68
1.0	5444	4819	5.17	4971	3846	4.12	4847	3618	3.88	4584	3103	3.33	4286	2644	2.83	3969	2340	2.51
1.2	5233	4609	4.94	4771	3687	3.95	4604	3426	3.67	4335	2933	3.15	4035	2499	2.68	-	-	-
1.4	5009	4394	4.71	4571	3537	3.79	4346	3233	3.47	4074	2762	2.96	3777	2356	2.53	-	-	-
1.6	4771	4174	4.48	4370	3395	3.64	4074	3040	3.26	3802	2590	2.78	-	-	-	-	-	-
1.8	4520	3951	4.24	4169	3262	3.50	3786	2850	3.06	-	-	-	-	-	-	-	-	-
2.0	4255	3728	4.00	3966	3137	3.36	-	-	-	-	-	-	-	-	-	-	-	-
2.2	3976	3505	3.76	3763	3020	3.24	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 23: 7-1/2 TON STANDARD MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	-	-	-	3736	1476	1.58	3487	1284	1.38	3231	1109	1.19	3001	970	1.04
0.6	-	-	-	3572	1514	1.62	3389	1339	1.44	3094	1151	1.23	2764	972	1.04	2446	824	0.88
0.8	3422	1558	1.67	3179	1364	1.46	2889	1164	1.25	2554	985	1.06	-	-	-	-	-	-
1.0	2891	1347	1.44	2372	1088	1.17	2050	922	0.99	-	-	-	-	-	-	-	-	-
1.2	2017	1051	1.13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 24: 7-1/2 TON OPTIONAL MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3910	1726	1.85
0.6	-	-	-	-	-	-	-	-	-	-	-	-	3857	1842	1.98	3597	1430	1.53
0.8	-	-	-	-	-	-	-	-	-	3804	1957	2.10	3503	1689	1.81	3172	1430	1.53
1.0	-	-	-	-	-	-	3774	2088	2.24	3406	1778	1.91	3032	1497	1.61	2248	1143	1.23
1.2	-	-	-	-	-	-	3327	1866	2.00	2926	1578	1.69	2160	1217	1.31	-	-	-
1.4	-	-	-	3270	1971	2.11	2537	1544	1.66	2043	1296	1.39	-	-	-	-	-	-
1.6	3196	2077	2.23	2460	1651	1.77	-	-	-	-	-	-	-	-	-	-	-	-
1.8	2426	1768	1.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 25: 10 TON STANDARD MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.2	-	-	-	-	-	-	-	-	-	3896	1639	1.76	3688	1453	1.56	3447	1268	1.36
0.4	4040	2076	2.23	4005	1934	2.07	3790	1698	1.82	3569	1508	1.62	3333	1330	1.43	3057	1147	1.23
0.6	3890	2006	2.15	3697	1790	1.92	3427	1550	1.66	3152	1356	1.45	-	-	-	-	-	-
0.8	3620	1882	2.02	3324	1629	1.75	2972	1380	1.48	-	-	-	-	-	-	-	-	-
1.0	3227	1708	1.83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 26: 10 TON OPTIONAL MOTOR DOWN SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	4965	3485	3.74	4875	3150	3.38	4613	2739	2.94	4322	2374	2.55	4156	2106	2.26	3907	1860	1.99
0.6	4876	3416	3.66	4651	2997	3.21	4359	2582	2.77	4038	2220	2.38	3860	1966	2.11	3590	1724	1.85
0.8	4713	3291	3.53	4387	2823	3.03	4077	2417	2.59	3719	2059	2.21	3541	1827	1.96	3242	1584	1.70
1.0	4476	3116	3.34	4084	2632	2.82	3768	2245	2.41	3365	1892	2.03	3197	1691	1.81	-	-	-
1.2	4165	2898	3.11	3741	2427	2.60	3432	2070	2.22	-	-	-	-	-	-	-	-	-
1.4	3779	2646	2.84	3359	2212	2.37	3069	1895	2.03	-	-	-	-	-	-	-	-	-
1.6	3319	2372	2.54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 27: 12-1/2 TON STANDARD MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	-	-	-	5201	3162	3.39	4966	2796	3.00	4681	2405	2.58	4355	2054	2.20
0.6	-	-	-	5220	3395	3.64	4942	2980	3.20	4657	2608	2.80	4358	2230	2.39	4007	1890	2.03
0.8	-	-	-	4944	3194	3.43	4661	2806	3.01	4378	2572	2.76	4016	2057	2.21	-	-	-
1.0	5003	3490	3.74	4647	2988	3.20	4380	2636	2.83	4030	2257	2.42	-	-	-	-	-	-
1.2	4724	3290	3.53	4363	2875	3.08	4012	2505	2.69	-	-	-	-	-	-	-	-	-
1.4	4428	3040	3.26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

TABLE 28: 12-1/2 TON OPTIONAL MOTOR SIDE SHOT BLOWER PERFORMANCE* †

ESP‡	TURNS OPEN**																	
	0			1			2			3			4			5		
	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP	CFM	W††	BHP
0.4	-	-	-	6447	5315	5.70	6207	4760	5.1046	5966	4205	4.51	5717	3716	3.98	5470	3307	3.55
0.6	-	-	-	6110	4917	5.27	5965	4464	4.79	5740	4023	4.31	5430	3501	3.75	5126	3054	3.28
0.8	-	-	-	5772	4519	4.85	5741	4274	4.58	5503	3821	4.10	5162	3294	3.53	4849	2870	3.08
1.0	6235	5521	5.92	5628	4407	4.73	5474	4048	4.34	5244	3611	3.87	4882	3101	3.33	4530	2667	2.86
1.2	5881	5137	5.51	5384	4205	4.51	5248	3854	4.13	4941	3387	3.63	4589	2906	3.12	4225	2502	2.68
1.4	5695	4950	5.31	5123	3996	4.29	5014	3670	3.94	4651	3178	3.41	4284	2716	2.91	3858	2280	2.45
1.6	5471	4728	5.07	4919	3828	4.11	4732	3460	3.71	4365	2983	3.20	3951	2516	2.70	3491	2058	2.21
1.8	5242	4514	4.84	4656	3611	3.87	4438	3240	3.47	3998	2740	2.94	3618	2316	2.48	-	-	-
2.0	4954	4231	4.54	4339	3380	3.62	3905	2861	3.07	3631	2497	2.68	-	-	-	-	-	-
2.2	4585	3934	4.22	4022	3149	3.38	-	-	-	-	-	-	-	-	-	-	-	-
2.4	4217	3637	3.90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2.6	3848	3340	3.58	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*. Blower performance for gas heat includes maximum number of heat tubes available for each tonnage.

†. Blower performance includes two-inch throwaway filters.

‡. ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

**. "Turns Open" refers to the setting of the variable pitch motor sheave, where "0 Turns Open" is fully closed.

††. W = Watts

NOTES FOR TABLE 17 THROUGH TABLE 28:

- Blower performance includes dry coil and two-inch filters.
- Blower performance for gas heat includes the maximum number of heat tubes available for each tonnage.
- ESP (External Static Pressure) given is that available for the supply and return air duct system. All internal resistances have been deducted from the total static pressure of the blower.

TABLE 29: INDOOR BLOWER SPECIFICATIONS

MODEL	MOTOR					MOTOR SHEAVE			BLOWER SHEAVE			BELT
	HP	RPM	Eff.	SF	Frame	Datum Dia. (in.)	Bore (in.)	Model	Datum Dia. (in.)	Bore (in.)	Model	
DM090	1-1/2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	9.0	1	AK94	A57
	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.5	1	AK79	A55
DM120	2	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	8.5	1	AK89	A56
	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
DM150	3	1725	80%	1.15	56	3.4 - 4.4	7/8	1VM50	7.0	1	AK74	A54
	5	1725	87%	1.15	184T	4.3 - 5.3	1 1/8	1VP56	6.7	1	BK77	BX55

AIR BALANCE

Start the supply air blower motor. Adjust the resistances in both the supply and the return air duct systems to balance the air distribution throughout the conditioned space. The job specifications may require that this balancing be done by someone other than the equipment installer.

CHECKING AIR QUANTITY

METHOD ONE

1. Remove the dot plugs from the duct panel (for location of the dot plugs see Figure 10).
2. Insert eight-inches of 1/4 inch metal tubing into the air-flow on both sides of the indoor coil.

NOTE: The tubes must be inserted and held in a position perpendicular to the air flow so that velocity pressure will not affect the static pressure readings.

3. Use an Inclined Manometer or Magnehelic to determine the pressure drop across a dry evaporator coil. Since the moisture on an evaporator coil can vary greatly, measuring the pressure drop across a wet coil under field conditions could be inaccurate. To assure a dry coil, the compressors should be de-activated while the test is being run.

NOTE: De-energize the compressors before taking any test measurements to assure a dry evaporator coil.

4. The CFM through the unit can be determined from the pressure drop indicated by the manometer by referring to Figure 23. In order to obtain an accurate measurement, be certain that the air filters are clean.
5. To adjust Measured CFM to Required CFM, see 'SUPPLY AIR DRIVE ADJUSTMENT'.
6. After readings have been obtained, remove the tubes and replace the dot plugs.

⚠WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

METHOD TWO

1. Drill two 5/16 inch holes, one in the return air duct as close to the inlet of the unit as possible, and another in the supply air duct as close to the outlet of the unit as possible.
2. Using the whole drilled in step 1, insert eight inches of 1/4 inch metal tubing into the airflow of the return and supply air ducts of the unit.

NOTE: The tubes must be inserted and held in position perpendicular to the airflow so that velocity pressure will not affect the static pressure readings.

3. Use an Inclined Manometer or Magnehelic to determine the pressure drop across the unit. This is the External Static Pressure (ESP). In order to obtain an accurate measurement, be certain that the air filters are clean.
4. Determine the number of turns the variable motor sheave is open.
5. Select the correct blower performance table for the unit from Tables 17 - 28. Tables are presented for horizontal and downflow configuration.
6. Determine the unit Measured CFM from the Blower Performance Table, External Static Pressure and the number of turns the variable motor sheave is open.
7. To adjust Measured CFM to Required CFM, see 'SUPPLY AIR DRIVE ADJUSTMENT'.
8. After reading has been obtained, remove the tubes and seal holes.

NOTE: With the addition of field installed accessories repeat this procedure.

⚠WARNING

Failure to properly adjust the total system air quantity can result in extensive blower damage.

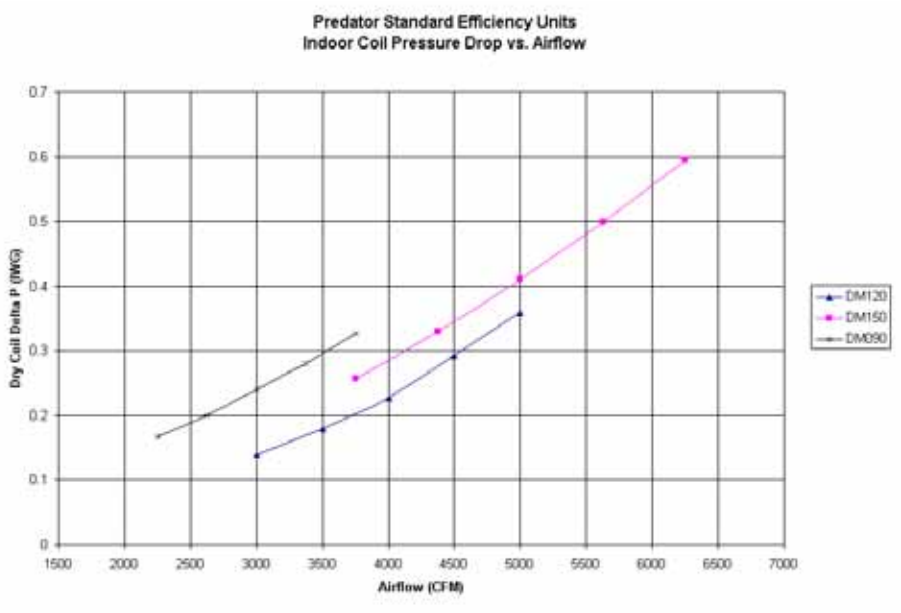


FIGURE 23 - DRY COIL DELTA P

SUPPLY AIR DRIVE ADJUSTMENT

⚠ CAUTION

Before making any blower speed changes review the installation for any installation errors, leaks or undesirable systems effects that can result in loss of airflow.

Even small changes in blower speed can result in substantial changes in static pressure and BHP. BHP and AMP draw of the blower motor will increase by the cube of the blower speed. Static pressure will increase by the square of the blower speed. Only qualified personnel should make blower speed changes, strictly adhering to the fan laws.

At unit start-up, the measured CFM may be higher or lower than the required CFM. To achieve the required CFM, the speed of the drive may have adjusted by changing the datum diameter (DD) of the variable pitch motor sheave as described below:

$$\left(\frac{\text{Required CFM}}{\text{Measured CFM}}\right) \bullet \text{Existing DD} = \text{New DD}$$

Use the following tables and the DD calculated per the above equation to adjust the motor variable pitch sheave.

EXAMPLE

A 12.5 ton unit was selected to deliver 4,000 CFM with a 3 HP motor, but the unit is delivering 3,800 CFM. The variable pitch motor sheave is set at 2 turns open.

Use the equation to determine the required DD for the new motor sheave,

$$\left(\frac{4{,}000\ \text{CFM}}{3{,}800\ \text{CFM}}\right) \bullet 4.0\ \text{in.} = 4.21\ \text{in.}$$

Use Table 31 to locate the DD nearest to 4.21 in. Close the sheave to 1 turn open.

New BHP

$= (\text{Speed increase})^3 \bullet \text{BHP at 3,800 CFM}$

$= (\text{Speed increase})^3 \bullet \text{Original BHP}$

= New BHP

New motor Amps

$= (\text{Speed increase})^3 \bullet \text{Amps at 3,800 CFM}$

$= (\text{Speed increase})^3 \bullet \text{Original Amps}$

= New Amps

TABLE 30: ADDITIONAL STATIC RESISTANCE

CFM	Cooling Only*	Economizer†‡	Electric Heat KW†				
			9	18	24	36	54
2300	0.08	0.02	0.07	0.08	0.09	0.10	0.13
2500	0.09	0.02	0.08	0.09	0.10	0.11	0.14
2700	0.11	0.03	0.09	0.10	0.12	0.13	0.16
2900	0.12	0.03	0.10	0.11	0.13	0.14	0.18
3100	0.14	0.03	0.12	0.13	0.15	0.16	0.20
3300	0.16	0.03	0.13	0.14	0.17	0.18	0.22
3500	0.18	0.04	0.15	0.16	0.19	0.20	0.24
3700	0.20	0.04	0.17	0.18	0.21	0.22	0.26
3900	0.23	0.04	0.19	0.20	0.23	0.24	0.28
4100	0.25	0.04	0.21	0.22	0.25	0.26	0.31
4300	0.28	0.05	0.23	0.24	0.28	0.29	0.34
4500	0.30	0.05	0.25	0.26	0.30	0.31	0.37
4700	0.33	0.05	0.28	0.29	0.33	0.34	0.40
4900	0.36	0.05	0.30	0.31	0.35	0.37	0.43
5100	0.39	0.06	0.33	0.34	0.38	0.40	0.46
5300	0.42	0.06	0.35	0.37	0.41	0.43	0.49
5500	0.45	0.06	0.38	0.40	0.44	0.46	0.53
5700	0.48	0.06	0.41	0.43	0.47	0.49	0.56
5900	0.52	0.07	0.44	0.46	0.50	0.53	0.59
6100	0.56	0.07	0.47	0.49	0.53	0.56	0.62
6300	0.60	0.07	0.50	0.53	0.56	0.59	0.65

*. Add these resistance values to the available static resistance in the respective Blower Performance Tables.

†. Deduct these resistance values from the available external static pressure shown in the respective Blower Performance Table.

‡. The pressure drop through the economizer is greater for 100% outdoor air than for 100% return air. If the resistance of the return air duct system is less than 0.25 IWG, the unit will deliver less CFM during full economizer operation.

TABLE 31: MOTOR SHEAVE DATUM DIAMETERS

1VM50x7/8 (1-1/2, 2 & 3 HP Motor)		1VP56x1-1/8 (5 HP Motor)	
Turns Open	Datum Diameter	Turns Open	Datum Diameter
0	4.4	**1**	5.3
1/2	4.3	**1-1/2**	5.2
1	4.2	**2**	5.1
1-1/2	4.1	**2-1/2**	5.0
2	4.0	**3**	4.9
2-1/2	3.9	**3-1/2**	4.8
3	3.8	**4**	4.7
3-1/2	3.7	**4-1/2**	4.6
4	3.6	**5**	4.5
4-1/2	3.5	**5-1/2**	4.4
5	3.4	**6**	4.3

OPERATION

SEQUENCE OF OPERATIONS OVERVIEW

For the Predator® series of units, the thermostat makes a circuit between "R" and "Y1" for the first stage of cooling.

The call is passed to the **Unit Control Board (UCB)**, which then determines whether the requested operation is available and, if so, which components to energize.

When the "W1" call is sensed, the indoor air blower is energized following a specified heating delay.

If at any time a call for both heating and cooling are present, the heating operation will be performed. If operating, the cooling system is halted as with a completion of a call for cooling. Heating always takes priority.

COOLING SEQUENCE OF OPERATION

CONTINUOUS BLOWER

By setting the room thermostat fan switch to "ON," the supply air blower will operate continuously.

INTERMITTENT BLOWER

With the room thermostat fan switch set to "AUTO" and the system switch set to either the "AUTO" or "HEAT" settings, the blower is energized whenever a cooling or heating operation is requested. The blower is energized after any specified delay associated with the operation.

When energized, the indoor blower has a minimum run time of 30 seconds. Additionally, the indoor blower has a delay of 10 seconds between operations.

NO OUTDOOR AIR OPTIONS

When the thermostat calls for the first stage of cooling, the low-voltage control circuit from “R” to “Y1” and “G” is completed. The UCB energizes the economizer (if installed and free cooling is available) or the first available compressor* and the condenser fans. For first stage cooling, compressor #1 is energized. If compressor #1 is unavailable, compressor #2 is energized. After completing the specified fan on delay for cooling, the UCB will energize the blower motor.

When the thermostat calls for the second stage of cooling, the low-voltage control circuit from “R” to “Y2” is completed. The control board energizes the first available compressor. If free cooling is being used for the first stage of cooling, compressor #1 is energized. If compressor #1 is active for first stage cooling or the first compressor is locked-out, compressor #2 is energized. In free-cooling mode, if the call for the second stage of cooling continues for 20 minutes, compressor #2 is energized, provided it has not been locked-out.

If there is an initial call for both stages of cooling, the UCB will delay energizing compressor #2 by 30 seconds in order to avoid a power rush.

Once the thermostat has been satisfied, it will de-energize Y1 and Y2. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling.

* To be available, a compressor must not be locked-out due to a high or low-pressure switch or freezestat trip and the **Anti-Short Cycle Delay (ASCD)** must have elapsed.

ECONOMIZER WITH SINGLE ENTHALPY SENSOR -

When the room thermostat calls for "first-stage" cooling, the low voltage control circuit from "R" to "G" and "Y1" is completed. The UCB energizes the blower motor (if the fan switch on the room thermostat is set in the "AUTO" position) and drives the economizer dampers from fully closed to their minimum position. If the enthalpy of the outdoor air is below the set point of the enthalpy controller (previously determined), "Y1" energizes the economizer. The dampers will modulate to maintain a constant supply air temperature as monitored by the discharge air sensor. If the outdoor air enthalpy is above the set point, "Y1" energizes compressor #1.

When the thermostat calls for "second-stage" cooling, the low voltage control circuit from "R" to "Y2" is completed. The UCB energizes the first available compressor. If the enthalpy of the outdoor air is below the set point of the enthalpy controller (i.e. first stage has energized the economizer), "Y2" will energize compressor #1. If the outdoor air is above the set point, "Y2" will energize compressor #2.

Once the thermostat has been satisfied, it will de-energize “Y1” and “Y2”. If the compressors have satisfied their minimum run times, the compressors and condenser fans are de-energized. Otherwise, the unit operates each cooling system until the minimum run times for the compressors have been completed. Upon the final compressor de-energizing, the blower is stopped following the elapse of the fan off delay for cooling, and the economizer damper goes to the closed position. If the unit is in continues fan operation, the economizer damper goes to the minimum position.

ECONOMIZER WITH DUAL ENTHALPY SENSORS -

The operation with the dual enthalpy sensors is identical to the single sensor except that a second enthalpy sensor is mounted in the return air. This return air sensor allows the economizer to choose between outdoor air and return air, whichever has the lowest enthalpy value, to provide maximum operating efficiency.

ECONOMIZER WITH POWER EXHAUST -

A unit equipped with an economizer (single or dual enthalpy) and a power exhaust operates as specified above with one addition. The power exhaust motor is energized 45 seconds after the actuator position exceeds the exhaust fan set point on the economizer control. When the power exhaust is operating, the second stage of mechanical cooling will not operate. As always, the "R" to "G" connection provides minimum position but does not provide power exhaust operation.

MOTORIZED OUTDOOR AIR DAMPERS -

This system operation is the same as the units with no outdoor air options with one exception. When the "R" to "G" circuit is complete, the motorized damper drives open to a position set by the thumbwheel on the damper motor. When the "R" to "G" circuit is opened, the damper spring returns fully closed.

COOLING OPERATION ERRORS

Each cooling system is monitored for operation outside of the intended parameters. Errors are handled as described below. All system errors override minimum run times for compressors.

HIGH-PRESSURE LIMIT SWITCH

During cooling operation, if a high-pressure limit switch opens, the UCB will de-energize the associated compressor, initiate the ASCD (Anti-short cycle delay), and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a high-pressure switch open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (see 37). If the other compressor is inactive, the condenser fans will be de-energized.

LOW-PRESSURE LIMIT SWITCH

The low-pressure limit switch is not monitored during the initial 30 seconds of a cooling system's operation. For the following 30 seconds, the UCB will monitor the low-pressure switch to ensure it closes. If the low-pressure switch fails to close after the 30-second monitoring phase, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

Once the low-pressure switch has been proven (closed during the 30-second monitor period described above), the UCB will monitor the low-pressure limit switch for any openings. If the low-pressure switch opens for greater than 5 seconds, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans.

If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a low-pressure switch open three times within one hour of operation, the UCB will lock-out the associated compressor and flash a code (37). If the other compressor is inactive, the condenser fans will be de-energized.

FREEZESTAT

During cooling operation, if a freezestat opens, the UCB will de-energize the associated compressor, initiate the ASCD, and, if the other compressor is idle, stop the condenser fans. If the call for cooling is still present at the conclusion of the ASCD, the UCB will re-energize the halted compressor.

Should a freezestat open three times within two hours of operation, the UCB will lock-out the associated compressor and flash a code (37). If the other compressor is inactive, the condenser fans will be de-energized.

LOW AMBIENT COOLING

To determine when to operate in low ambient mode, the UCB has a pair of terminals connected to a temperature-activated switch set at 45ºF. When the low ambient switch is closed and the thermostat is calling for cooling, the UCB will operate in the low ambient mode.

Low ambient mode operates the compressors in this manner: 10 minutes on, 5 minutes off. The indoor blower is operated throughout the cycle. The 5-minute off period is necessary to defrost the indoor coil.

Low ambient mode always begins with compressor operation. Compressor minimum run time may extend the minutes of compressor operation. The defrost cycle will begin immediately following the elapse of the minimum run time.

When operating in low ambient mode, the UCB will not lock-out the compressors due to a freezestat trip. However, a freezestat trip will de-energize the associated compressor. If the call for cooling is still present at the end of the ASCD and the freezestat has closed, the unit will resume operation.

SAFETY CONTROLS

The unit control board monitors the following inputs for each cooling system:

1. A suction line freezestat to protect against low evaporator temperatures due to a low airflow or a low return air temperature, (opens at 26 ± 5 °F and resets at 38 ± 5°F).
2. A high-pressure switch to protect against excessive discharge pressures due to a blocked condenser coil or a condenser motor failure, (opens at 405 ± 10 psig or 440 ± 10 psig depending on unit model).
3. A low-pressure switch to protect against loss of refrigerant charge, (opens at 7 ± 3 psig or 22 ± 5 psig).

The above pressure switches are hard-soldered to the unit. The refrigeration systems are independently monitored and controlled. On any fault, only the associated system will be affected by any safety/preventive action. The other refrigerant system will continue in operation unless it is affected by the fault as well.

The unit control board monitors the temperature limit switch of electric heat units and the temperature limit switch and the gas valve of gas furnace units.

COMPRESSOR PROTECTION

In addition to the external pressure snitches, the compressors also have inherent (internal) protection. If there is an abnormal temperature rise in a compressor, the protector will open to shut down the compressor. The UCB incorporates features to minimize compressor wear and damage. An **Anti-Short Cycle Delay (ASCD)** is utilized to prevent operation of

a compressor too soon after its previous run. Additionally, a minimum run time is imposed any time a compressor is energized.

The ASCD is initiated on unit start-up and on any compressor reset or lock-out.

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES 37.

RESET

Remove the call for cooling, by raising thermostat setting higher than the conditioned space temperature. This resets any pressure or freezestat flash codes.

ELECTRIC HEATING SEQUENCE OF OPERATIONS

The following sequence describes the operation of the electric heat section.

Two-stage heating:

a. Upon a call for first stage heat by the thermostat, the heater relay (RA) will be energized. After completing the specified fan on delay for heating, the UCB will energize the blower motor. If the second stage of heat is required, heater relay (RB) will be energized. After completing the specified fan on delay for heating, the UCB will energize the blower motor.

b. The thermostat will cycle the electric heat to satisfy the heating requirements of the conditioned space.

ELECTRIC HEATING OPERATION ERRORS

TEMPERATURE LIMIT

If the UCB senses zero volts from the high temperature limit, the indoor blower motor is immediately energized.

This limit is monitored regardless of unit operation status, i.e. the limit is monitored at all times.

If the temperature limit opens three times within one hour, it will lock-on the indoor blower motor and a flash code is initiated (See Table 37).

SAFETY CONTROLS

The UCB monitors the temperature limit switch of electric heat units.

The control circuit includes the following safety controls:

LIMIT SWITCH (LS)

This control is located inside the heater compartment and is set to open at the temperature indicated in the Electric Heat Limit Setting Table 32. It resets automatically. The limit switch operates when a high temperature condition, caused by inadequate supply air flow occurs, thus shutting down the heater and energizing the blower.

TABLE 32: ELECTRIC HEAT LIMIT SETTING

UNIT (TONS)	VOLTAGE	HEATER kW	LIMIT SWITCH OPENS °F
7.5	380	9	150
7.5, 10, 12.5		18	150
7.5, 10, 12.5		24	150
7.5, 10, 12.5		34	150
10, 12.5		54	130

FLASH CODES

The UCB will initiate a flash code associated with errors within the system. Refer to UNIT CONTROL BOARD FLASH CODES Table 37.

RESET

Remove the call for heating by lowering the thermostat setting lower than the conditioned space temperature.This resets any flash codes.

ELECTRIC HEAT ANTICTPATOR SETPOINTS

It is important that the anticipator setpoint be correct. Too high of a setting will result in longer heat cycles and a greater temperature swing in the conditioned space. Reducing the value below the correct setpoint will give shorter “ON” cycles and may result in the lowering of the temperature within the conditioned space. Refer to Table 33 for the required electric heat anticipator setting.

TABLE 33: ELECTRIC HEAT ANTICIPATOR SETPOINTS

SETTING, AMPS	
W1	W2
0.13	0.1

START-UP (COOLING)

PRESTART CHECK LIST

After installation has been completed:

1. Check the electrical supply voltage being supplied. Be sure that it is the same as listed on the unit nameplate.
2. Set the room thermostat to the off position.
3. Turn unit electrical power on.
4. Set the room thermostat fan switch to on.
5. Check indoor blower rotation.
   - If blower rotation is in the wrong direction. Refer to Phasing Section in general information section.
   - Check blower drive belt tension.
6. Check the unit supply air (CFM).
7. Measure evaporator fan motor's amp draw.
8. Set the room thermostat fan switch to off.
9. Turn unit electrical power off.

OPERATING INSTRUCTIONS

1. Turn unit electrical power on.

NOTE: Prior to each cooling season, the crankcase heaters must be energized at least 10 hours before the system is put into operation.

2. Set the room thermostat setting to lower than the room temperature.
3. First stage compressors will energize after the built-in time delay (five minutes).
4. The second stage of the thermostat will energize second stage compressor if needed.

POST START CHECK LIST

1. Verify proper system pressures for both circuits.
2. Measure the temperature drop across the evaporator coil.

CHARGING THE UNIT

These units should be charged using the superheat method. Super heat charging data is shown in Tables 34 thru 36.

When charging each system, superheat data should be taken at the compressor inlet.

TABLE 34: 7.5 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 3000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	10.6	13.5	16.3	19.1	22.0	24.8	27.7	29.1	30.5	32.0	33.4
70	8.4	11.1	13.8	16.5	19.3	22.0	24.7	26.5	28.4	30.2	32.0
75	6.1	8.7	11.3	13.9	16.6	19.2	21.8	24.0	26.2	28.4	30.6
80	-	6.4	8.9	11.4	13.9	16.3	18.8	21.4	24.0	26.6	29.2
85	-	-	6.4	8.8	11.1	13.5	15.9	18.9	21.9	24.8	27.8
90	-	-	5.8	7.9	10.1	12.2	14.3	17.2	20.2	23.1	26.1
95	-	-	5.3	7.1	9.0	10.8	12.7	15.6	18.5	21.5	24.4
100	-	-	-	6.3	7.7	9.0	10.4	13.5	16.6	19.7	22.8
105	-	-	-	5.5	6.4	7.3	8.1	11.4	14.6	17.9	21.2
110	-	-	-	-	5.1	5.5	5.9	9.3	12.7	16.1	19.5
115	-	-	-	-	-	-	-	7.2	10.8	14.3	17.9

TABLE 35: 10 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 4000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	19.6	20.8	22.0	23.2	24.4	25.6	26.9	28.4	29.9	31.4	32.9
70	14.4	16.0	17.5	19.0	20.5	22.0	23.5	25.4	27.3	29.2	31.0
75	9.3	11.1	12.9	14.7	16.6	18.4	20.2	22.4	24.7	26.9	29.1
80	-	6.3	8.4	10.5	12.6	14.8	16.9	19.5	22.0	24.6	27.2
85	-	-	-	6.3	8.7	11.1	13.6	16.5	19.4	22.4	25.3
90	-	-	-	5.6	7.8	9.9	12.0	15.0	17.9	20.8	23.7
95	-	-	-	-	6.8	8.7	10.5	13.4	16.3	19.3	22.2
100	-	-	-	-	5.3	6.7	8.1	10.8	13.5	16.2	18.9
105	-	-	-	-	-	-	5.7	8.1	10.6	13.1	15.5
110	-	-	-	-	-	-	-	5.5	7.7	10.0	12.2
115	-	-	-	-	-	-	-	-	-	6.9	8.9

TABLE 36: 12.5 TON STANDARD EFFICIENCY SUPERHEAT CHARGING

Outdoor Temp (°F)	Superheat at Compressor Suction (°F) Airflow = 5000 CFM										
	Indoor WB Temp (°F)										
	55	57	59	61	63	65	67	69	71	73	75
65	33.9	34.5	35.1	35.7	36.3	36.9	37.5	38.1	38.7	39.3	39.9
70	30.2	31.0	31.8	32.7	33.5	34.3	35.2	36.0	36.8	37.7	38.5
75	26.4	27.5	28.6	29.6	30.7	31.8	32.8	33.9	35.0	36.0	37.1
80	23.5	24.7	26.0	27.2	28.4	29.7	30.9	32.1	33.4	34.6	35.8
85	20.6	22.0	23.4	24.8	26.2	27.6	29.0	30.4	31.8	33.2	34.6
90	17.2	18.8	20.3	21.9	23.5	25.0	26.6	28.2	29.7	31.3	32.9
95	13.8	15.5	17.2	19.0	20.7	22.4	24.2	25.9	27.6	29.4	31.1
100	9.9	11.8	13.6	15.5	17.4	19.2	21.1	23.0	24.8	26.7	28.6
105	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0
110	4.8	6.5	8.2	9.8	11.5	13.2	14.8	16.5	18.2	19.8	21.5
115	3.7	5.0	6.3	7.7	9.0	10.3	11.7	13.0	14.3	15.7	17.0

NORMAL MAINTENANCE

⚠ CAUTION

Prior to any of the following maintenance procedures, shut off all power to the unit to prevent personal injury.

Periodic maintenance normally consists of changing or cleaning filters.

GENERAL

FILTERS

Inspect once a month. Replace disposable or clean permanent type as necessary. DO NOT replace permanent type with disposable.

MOTORS

Indoor fan and outdoor fan motors are permanently lubricated and require no maintenance.

OUTDOOR COIL

Dirt should not be allowed to accumulate on the outdoor coil surface or other parts in the air circuit. Cleaning should be as often as necessary to keep coil clean. Use a brush, vacuum cleaner attachment, or other suitable means. If water is used to clean coil, be sure power to the unit is shut off prior to cleaning. Service access is provided in the front and rear condenser compartment panels to provide improved access to the condenser coils.

⚠WARNING

Do not remove service panels or attempt to clean the interior of the condenser section when the unit is powered and/or operating. Shut off all power to the unit prior to cleaning or maintenance of the condenser section internals.

NOTE: Exercise care when cleaning the coil so that the coil fins are not damaged. Do not permit the outdoor air discharge to be obstructed by overhanging structures of shrubs.

TROUBLESHOOTING

⚠WARNING

Troubleshooting of components may require opening the electrical control box with the power connected to the unit. **Use extreme care when working with live circuits!** Check the unit nameplate for the correct line voltage and set the voltmeter to the correct range before making any connections with line terminals.

When not necessary, shut off all electric power to the unit prior to any of the following maintenance procedures so as to prevent personal injury.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation which could cause injury to person and/or damage unit components. Verify proper operation after servicing.

PREDATOR® FLASH CODES

Various flash codes are utilized by the unit control board (UCB) to aid troubleshooting. Flash codes are distinguished by the short on and off cycle used (approximately 200ms on and 200ms off). To show normal operation, the control board flashes a 1 second on, 1 second off “heartbeat” during normal operation. This is to verify that the UCB is functioning correctly. Do not confuse this with an error flash code. To prevent confusion, a 1-flash, flash code is not used.

Current alarms are flashed on the UCB LED. The alarm history can be checked by pressing and releasing the ALARMS button on the UCB. The UCB will cycle through the last five (5) alarms, most recent to oldest, separating each alarm flash code by approximately 2 seconds.

In some cases, it may be necessary to “zero” the ASCD for the compressors in order to perform troubleshooting. To reset all ASCDs for one cycle, press and release the UCB TEST button once.

TABLE 37: UNIT CONTROL BOARD FLASH CODES

Flash Code	Description
On Steady	Control Failure - Replace Control
Heart Beat	Normal Operation
1 Flash	Not Applicable
2 Flashes	Control waiting ASCD*
3 Flashes	HPS1 - Compressor Lock out
4 Flashes	HPS2 - Compressor Lock out
5 Flashes	LPS1 - Compressor Lock out
6 Flashes	LPS2 - Compressor Lock out
7 Flashes	FS1 - Compressor Lock out
8 Flashes	FS2 - Compressor Lock out
9 Flashes	Ignition Control Locked Out/ Ignition Control Failure / Limit Switch Trip / No Jumper Plug in Heat Section
10 Flashes	Compressors Locked Out On Low Outdoor Air Temperature*
11 Flashes	Compressors Locked Out Because The Economizer Is Using Free Cooling*
12 Flashes	Fan Overload Switch Trip - Not Applicable On This Unit *
13 Flashes	Compressor Held Off Due To Low Voltage*
14 Flashes	EEPROM Storage Failure (Control Failure)
OFF	No Power or Control Failure

*. These flash codes do not represent alarms.

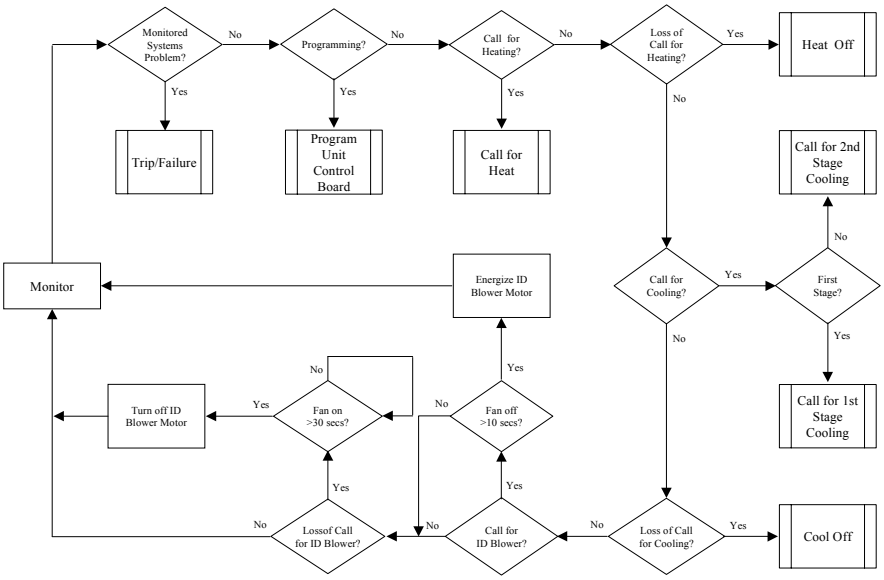


FIGURE 24 - BASIC TROUBLESHOOTING FLOWCHART

COOLING TROUBLESHOOTING GUIDE

On calls for cooling, if the compressors are operating but the supply air blower motor does not energize after a short delay (the room thermostat fan switch is in the “AUTO” position):

1. Turn the thermostat fan switch to the ON position. If the supply air blower motor does not energize, go to Step 3.
2. If the blower motor runs with the fan switch in the ON position but will not run after the first compressor has energized when the fan switch is in the AUTO position, check the room thermostat for contact between R and G in the AUTO position during calls for cooling.
3. If the supply air blower motor does not energize when the fan switch is set to ON, check that line voltage is being supplied to the contacts of the M3, contactor, and that the contactor is pulled in. Check for loose wiring between the contactor and the supply air blower motor.
4. If M3 is pulled in and voltage is supplied to M3, lightly touch the supply air blower motor housing. If it is hot, the motor may be off on internal protection. Cancel any thermostat calls and set the fan switch to AUTO. Wait for the internal overload to reset. Test again when cool.
5. If M3 is not pulled in, check for 24 volts at the M3 coil. If 24 volts are present at M3 but M3 is not pulled in, replace the contactor.
6. Failing the above, if there is line voltage supplied at M3, M3 is pulled in, and the supply air blower motor still does not operate, replace the motor.
7. If 24 volts is not present at M3, check that 24 volts is present at the UCB supply air blower motor terminal, “FAN”. If 24 volts is present at the FAN, check for loose wiring between the UCB and M3.
8. If 24 volts is not present at the “FAN” terminal, check for 24 volts from the room thermostat. If 24 volts are not present from the room thermostat, check for the following:
    a. Proper operation of the room thermostat (contact between R and G with the fan switch in the ON position and in the AUTO position during operation calls).
    b. Proper wiring between the room thermostat and the UCB, and
    c. Loose wiring from the room thermostat to the UCB
9. If 24 volts is present at the room thermostat but not at the UCB, check for proper wiring between the thermostat and the UCB, i.e. that the thermostat G terminal is connected to the G terminal of the UCB, and for loose wiring.
10. If the thermostat and UCB are properly wired, replace the UCB.

On calls for cooling, the supply air blower motor is operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position):

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling and the compressors will not immediately operate. If both stages of cooling are requested simultaneously and the economizer provides free cooling, following a short delay compressor #1 will be energized unless it is locked out. If compressor #1 is locked out, compressor #2 is energized. Compressor #2 is always energized in place of compressor #1 when compressor #1 is requested but locked out.
2. If no economizer is installed or the economizer is not opening to provide free cooling and compressor #1 does not energize on a call for cooling, check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.
3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.
4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts are present and M1 is not pulled in, replace the contactor.
5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.
6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.
7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts is not present from the room thermostat, check for the following:
    a. 24 volts at the thermostat Y1 terminal
    b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and
    c. Loose wiring from the room thermostat to the UCB
8. If 24 volts is present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.
9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have

locked out the compressor for repeat trips. The UCB should be flashing an alarm code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, cancel any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lockouts, compressor #1 may be held off for the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*: If 24 volts is present at the Y1 OUT terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

13. *For units with economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. If nothing is found, the economizer control may have faulted and is failing to return the 24-volt “call” to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug. If compressor #1 energizes, there is a fault in the economizer wiring or the economizer control.

14. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local York distributors can test the UCB for this programming.

15. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.

16. If none of the above correct the error, replace the UCB.

On calls for the second stage of cooling, the supply air blower motor and compressor #1 are operating but compressor #2 is not (the room thermostat fan switch is in the “AUTO” position):

1. If installed, check the position of the economizer blades. If the blades are open, the economizer is providing free cooling. If the second stage of cooling is requested, following a short delay, compressor #1 will be energized unless it is locked out. Typically, compressor #2 is energized only during free cooling if the call for the second stage of cooling persists for 20 minutes.

2. Compressor #2 will not energize simultaneously with compressor #1 if a call for both stages of cooling is received. The UCB delays compressor #2 by 30 seconds to prevent a power surge. If after the delay compressor #2 does not energize on a second stage call for cooling, check for line voltage at the compressor contactor, M2, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M2 is pulled in and voltage is supplied at M2, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M2 is not pulled in, check for 24 volts at the M2 coil. If 24 volts is present and M2 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M2, M2 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M2, check for 24 volts at the UCB terminal, C2. If 24 volts are present, check for loose wiring between C2 and the compressor contactor.

7. If 24 volts is not present at the C2 terminal, check for 24 volts from the room thermostat at the UCB Y2 terminal. If 24 volts is not present from the room thermostat, check for the following:

   a. 24 volts at the thermostat Y2 terminal

   b. Proper wiring between the room thermostat and the UCB, i.e. Y1 to Y1, Y2 to Y2, and

   c. Loose wiring from the room thermostat to the UCB

8. If 24 volts is present at the UCB Y2 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS2, LPS2, and FS2 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS2 has opened, there will be 24 volts of potential between the LPS2 terminals.

9. If 24 volts is present at the UCB Y2 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out,

   remove any call for cooling at the thermostat or by disconnecting the thermostat wiring at the Y2 UCB terminal. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #1 will be held off for the ASCD, and compressor #2 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y2 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. Local York distributors can test the UCB for this programming.

12. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C2 terminal wire and jumper it to the Y2 terminal. DO NOT jump the Y2 to C2 terminals. If the compressor engages, the UCB has faulted.

13. If none of the above correct the error, replace the UCB.

On a call for cooling, the supply air blower motor and compressor #2 are operating but compressor #1 is not (the room thermostat fan switch is in the “AUTO” position):

1. Compressor #2 is energized in place of compressor #1 when compressor #1 is unavailable for cooling calls. Check the UCB for alarms indicating that compressor #1 is locked out. Press and release the ALARMS button if the LED is not flashing an alarm.

2. Check for line voltage at the compressor contactor, M1, and that the contactor is pulled in. Check for loose wiring between the contactor and the compressor.

3. If M1 is pulled in and voltage is supplied at M1, lightly touch the compressor housing. If it is hot, the compressor may be off on inherent protection. Cancel any calls for cooling and wait for the internal overload to reset. Test again when cool.

4. If M1 is not pulled in, check for 24 volts at the M1 coil. If 24 volts is present and M1 is not pulled in, replace the contactor.

5. Failing the above, if voltage is supplied at M1, M1 is pulled in, and the compressor still does not operate, replace the compressor.

6. If 24 volts is not present at M1, check for 24 volts at the UCB terminal, C1. If 24 volts is present, check for loose wiring between C1 and the compressor contactor.

7. If 24 volts is not present at the C1 terminal, check for 24 volts from the room thermostat at the UCB Y1 terminal. If 24 volts are not present at the UCB Y1 terminal, the UCB may have faulted. Check for 24 volts at the Y1 ECON terminal. If 24 volts is not present at Y1 “ECON”, the UCB has faulted. The UCB should de-energize all compressors on a loss of call for the first stage of cooling, i.e. a loss if 24 volts at the Y1 terminal.

8. If 24 volts are present at the UCB Y1 terminal, the compressor may be out due to an open high-pressure switch, low-pressure switch, or freezestat. Check for 24 volts at the HPS1, LPS1, and FS1 terminals of the UCB. If a switch has opened, there should be a voltage potential between the UCB terminals, e.g. if LPS1 has opened, there will be a 24-volt potential between the LPS1 terminals.

9. If 24 volts is present at the UCB Y1 terminal and none of the protection switches have opened, the UCB may have locked out the compressor for repeat trips. The UCB should be flashing a code. If not, press and release the ALARMS button on the UCB. The UCB will flash the last five alarms on the LED. If the compressor is locked out, remove any call for cooling. This will reset any compressor lock outs.

NOTE: While the above step will reset any lock outs, compressor #2 will be held off for the ASCD, and compressor #1 may be held off for a portion of the ASCD. See the next step.

10. If 24 volts is present at the UCB Y1 terminal and none of the switches are open and the compressor is not locked out, the UCB may have the compressor in an ASCD. Check the LED for an indication of an ASCD cycle. The ASCD should time out within 5 minutes. Press and release the TEST button to reset all ASCDs.

11. If 24 volts is present at the UCB Y1 terminal and the compressor is not out due to a protective switch trip, repeat trip lock out, or ASCD, the economizer terminals of the UCB may be improperly wired. Check for 24 volts at the Y1 “OUT” terminal of the UCB. If 24 volts is present, trace the wiring from Y1 “OUT” for incorrect wiring. If 24 volts is not present at the Y1 “OUT” terminal, the UCB must be replaced.

12. *For units without economizers*: If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON” terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, the jumper in the Mate-N-Lock plug, and in the wiring from the Mate-N-Lock plug to the Y1 “ECON” terminal.

    For units with economizers:If 24 volts is present at the Y1 “OUT” terminal, check for 24 volts at the Y1 “ECON”

terminal. If 24 volts is not present, check for loose wiring from the Y1 “OUT” terminal to the Mate-N-Lock plug, a poor connection between the UCB and economizer Mate-N-Lock plugs, loose wiring from the Mate-N-Lock plug to the economizer, back to the Mate-N-Lock plug, and from the Mate-N-Lock plug to the Y1 “ECON” terminal. The economizer control may have faulted and is not returning the 24 volts to the Y1 “ECON” terminal even though the economizer is not providing free cooling. To test the economizer control, disconnect the Mate-N-Locks and jumper between the WHITE and YELLOW wires of the UCB’s Mate-N-Lock plug.

13. The UCB can be programmed to lock out compressor operation during free cooling and in low ambient conditions. These options are not enabled by default. They can be checked by local York distributors.
14. If none of the above corrected the error, test the integrity of the UCB. Disconnect the C1 terminal wire and jumper it to the Y1 terminal. DO NOT jump the Y1 to C1 terminals. If the compressor engages, the UCB has faulted.
15. If none of the above correct the error, replace the UCB.

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